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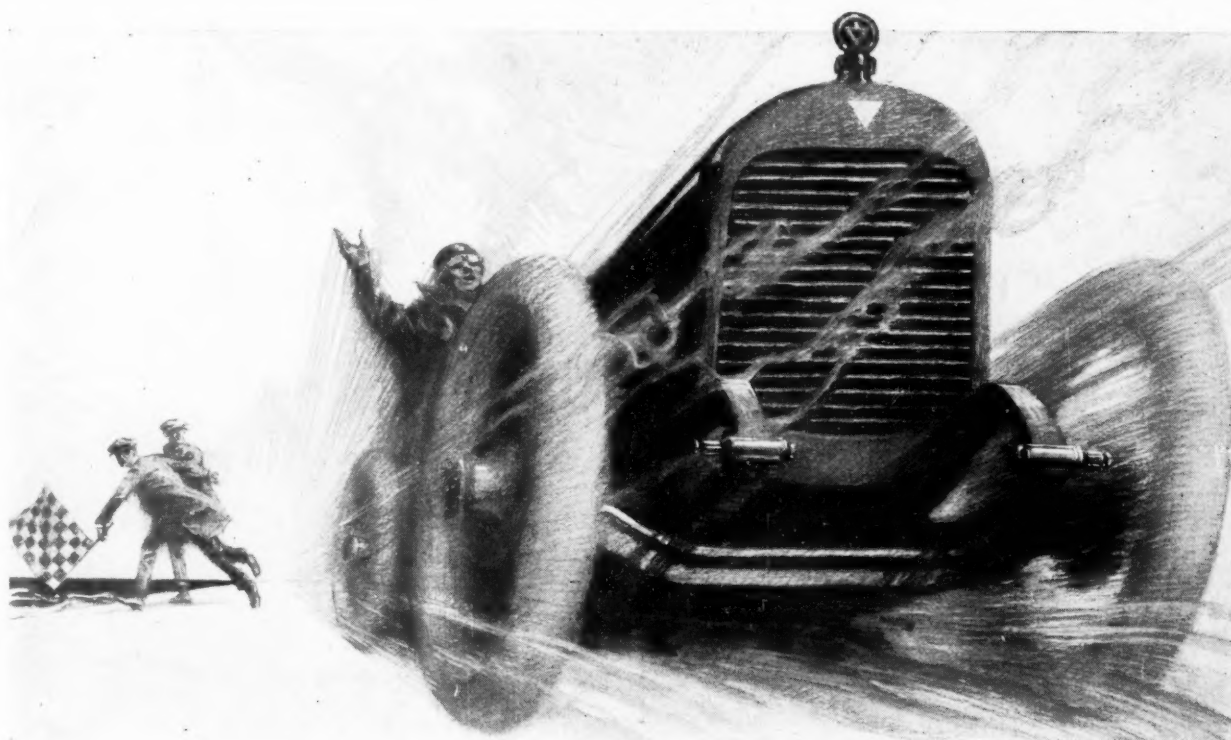
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# The AUTOMOBILE and Automotive Industries

Vol. XXXVII  
No. 2

NEW YORK, JULY 12, 1917

Ten cents a copy  
Three dollars a year



## Hudson Speedway Records Help Dealers Sell Cars

Certified records of performance and endurance make sales for Hudson dealers. Hudson last year won records for speed and endurance that have never been equaled, and Hudson dealers sold over 27,000 cars.

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# *The* **AUTOMOBILE** *and* **Automotive Industries**

VOL. XXXVII

NEW YORK—THURSDAY, JULY 12, 1917—CHICAGO

No. 2

**W**ITH this issue, under its new name, THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES enters a new and wider field of service. Long ago we foresaw and foretold the wonderful expansion of the automobile business into all branches of automotive manufacture. We laid our plans accordingly, extended our editorial staff and broadened the scope of our work to cover this wider field.

The publication has, in fact, altogether outgrown the field in which it started, just as the industry has outgrown the borders originally conceived, and it has, consequently, outgrown its name to such an extent that the name has been changed to more closely measure its stature.

Of late the industries which have arisen out of the application of the internal combustion engine, in its development in transportation, aeronautic, marine, farm and other fields, recognizing the necessity for co-ordination growing out of the mass of these new possibilities of production, have come together through their engineering and scientific departments, so that, in the work of standardization and the establishment of the interchangeability of parts, they are being co-ordinated as far as possible.

The last 6 months witnessed the expansion of the Society of Automobile Engineers into the Society of Automotive Engineers, in which those who have specialized in the development of automobiles, trucks, tractors, airplanes, stationary engines and marine work in this field, have joined hands to the obvious advantage of all. At this time the combined industries represented in this development are facing new problems and requirements.

This publication is in close touch with all of them, knows their problems, their unlimited possibilities, and is prepared to help them to success. The policy of practical service which characterized *The Automobile* as the industrial authority in its field from the beginning of the automobile business will be developed to a still higher plane in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.



# Building Gnome Airplane Engines

## Part I

### A Study of Methods Used in Production of Revolving Cylinder Engines of French Design—High-Class Workmanship Required, as Tolerances Are Exceedingly Close

**EDITOR'S NOTE.**—This is the first of a series of articles which will deal exhaustively with the different types of airplane engines now being produced in the United States, both from the standpoint of design and that of manufacture. In view of the great demand for airplanes for the Army and Navy, many of the large automobile plants of the country, in addition to existing airplane factories, will shortly be devoted to the production of airplane engines. The subject is therefore one of unusual timeliness.

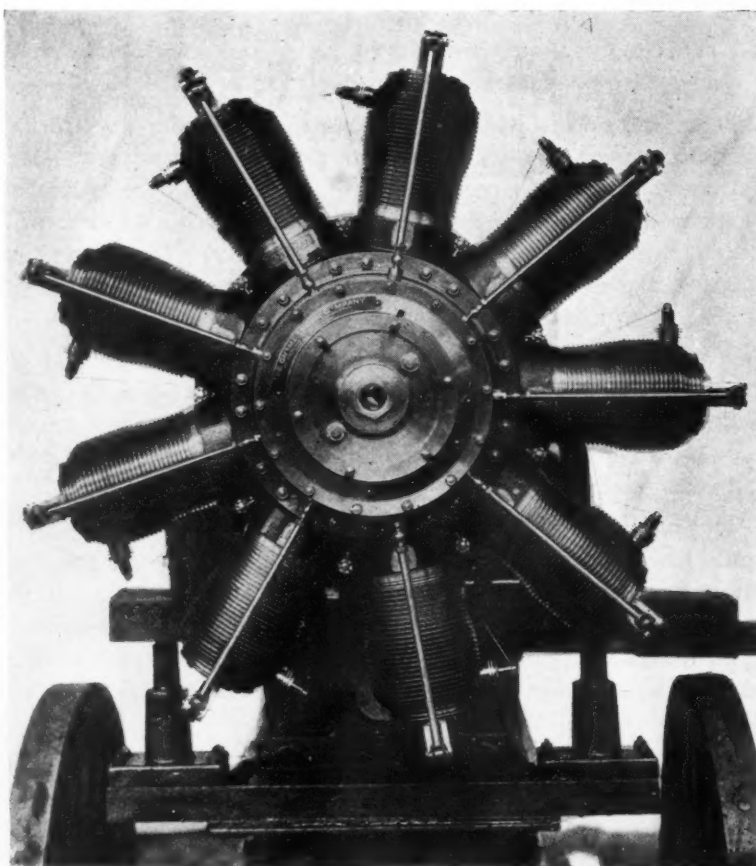
By P. M. Heldt

AT the recent dinner of the Society of Automotive Engineers E. A. Deeds of the Airplane Production Board explained that there were three lines open for the Government in securing airplane engines for the Army. One of these, he said, was to secure designs of successful foreign engines and produce them in this country. This has already been done in a number of instances, the first American concern to take up the manufacture of a foreign airplane engine having been the General Vehicle Co. of Long Island City, N. Y., which about a year ago secured from the Gnome & Le Rhone Engine Co. of London the rights to manufacture the 100 hp. Gnome engine in the United States. This design of engine, which has been under development abroad for 17 years, has been used largely for planes for high speed scouting work and is remarkable for its low weight per horse power. In order to secure this high weight efficiency it is necessary to machine practically every sur-

face on every part of the engine, and the very closest tolerances have to be worked to. Thus in many parts the tolerances are as low as 0.01 mm., which is equivalent to 0.0004 in. It will be seen from this that the very highest class of workmanship is required in manufacturing these engines;

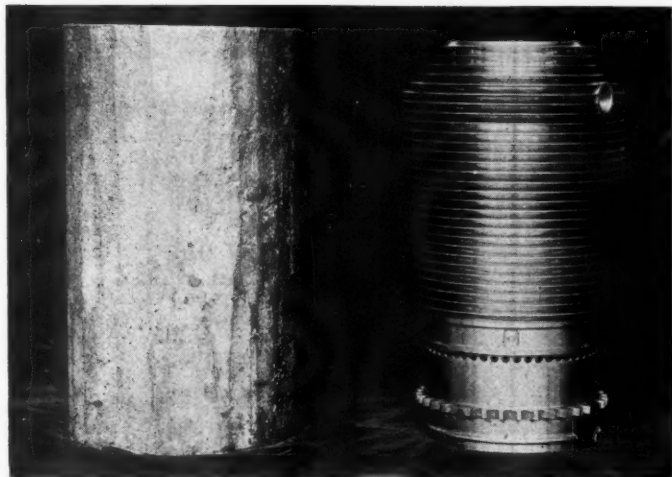
and as a large number of parts have to be finished all over, which in automobile engines would be left in the rough on most of their surfaces, it will readily be realized that the manufacturing cost as compared with an automobile engine is not nearly measured by the ratio in output.

The Gnome engine is of the revolving cylinder type in which the ordinary order of things is reversed. Instead of the cylinders being stationary and the crankshaft being revolved by the reciprocations of the pistons, the crankshaft is rigidly keyed to the support and the cylinders are caused to revolve by the side thrust exerted against their walls by the pistons in consequence of the inclination of the connecting-rods in all but



End view of Gnome engine mounted on portable testing stand





Solid block from which the cylinder is produced and the completed cylinder. The original weight is 88 lb., the final weight about 5½ lb.

the dead center positions. There are two chief advantages in this construction: one is that the revolving cylinders and pistons possess great fly-wheel capacity and insure very steady operation without flutter, and the other, that owing to the rapid rotation of the cylinders in the air they can be very effectively air-cooled. Thus the weight of the cooling system ordinarily required, including the radiator, pump, water and connections, is eliminated, and a very light motor results.

#### Cycle of Operations

In the present design of the Gnome motor a cycle of operations somewhat different from that employed in the ordinary four-cycle engine is made use of. This cycle does away with the need for the usual inlet valve and makes the engine operable with only a single valve, hence the name *monosoupape* or "single-valve." The cycle is as follows: A charge being compressed in the outer end of the cylinder or combustion chamber, it is ignited by a spark produced by the spark plug located in the side of this chamber, and the burning charge expands as the piston moves down in the cylinder while the latter revolves around the crank shaft. When the piston is about half way down on the power stroke the exhaust valve, which is located in the center of the cylinder head, is mechanically opened, and during the following up-stroke of the piston the burnt gases are expelled from the cylinder through the exhaust valve directly into the atmosphere.

Instead of closing at the end of the exhaust stroke, or a few degrees thereafter, the exhaust valve is held open for about two-thirds of the following inlet stroke of the piston, with the result that fresh air is drawn through the exhaust valve into the cylinder. When the cylinder is still 65 deg. from the end of the inlet half-revolution, the exhaust valve closes. As no more air can get into the cylinder, and as the piston continues to move inwardly, it is obvious that a partial vacuum is formed.

#### Drawing Fuel from Crank Chamber

When the cylinder approaches within 20 deg. of the end of the inlet half-revolution a series of small inlet ports all around the circumference of the cylinder wall is uncovered by the top edge of the piston, whereby the combustion chamber is placed in communication with the crank chamber. As the pressure in the crank chamber is substantially atmospheric and that in the combustion chamber is below atmospheric, there results a suc-

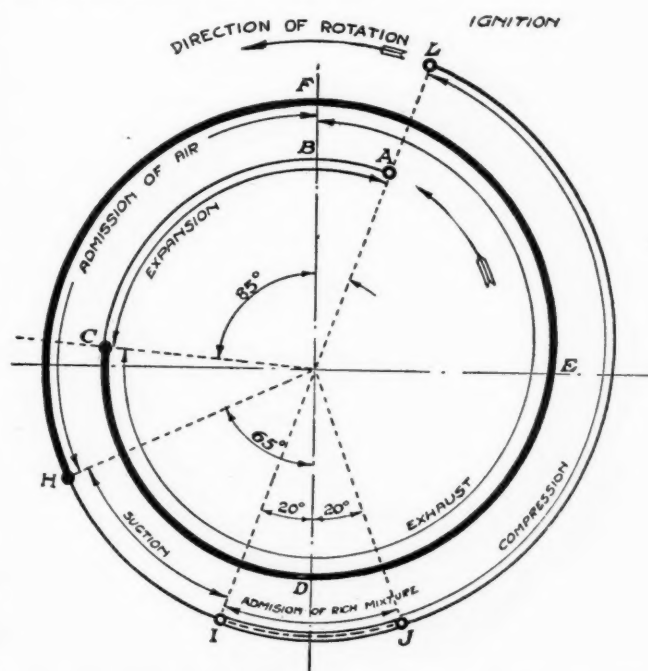
tion effect which causes the air from the crank chamber to flow into the combustion chamber. The air in the crank chamber is heavily charged with gasoline vapor, which is due to the fact that a spray nozzle connected with the gasoline supply tank is located inside the chamber. The proportion of gasoline vapor in the air in the crank chamber is several times as great as in the ordinary combustible mixture drawn from a carbureter into the cylinder. This extra-rich mixture is diluted in the combustion chamber with the air which entered it through the exhaust valve during the first part of the inlet stroke, thus forming a mixture of the proper proportion for complete combustion.

The inlet ports in the cylinder wall remain open until 20 deg. of the compression half-revolution has been completed, and from that moment to near the end of the compression stroke the gases are compressed in the cylinder. Near the end of the stroke ignition takes place and this completes the cycle.

#### Exhaust Open Over a Revolution

The exact timing of the different phases of the cycle is shown in the accompanying diagram. It will be seen that ignition occurs substantially 20 deg. ahead of the outer dead center, and expansion of the burning gases continues until 85 deg. past the outer dead center, when the piston is a little past half stroke. Then the exhaust valve opens and remains open for somewhat more than a complete revolution of the cylinders, or, to be exact, for 390 deg. of cylinder travel, until 115 deg. past the top dead center on the second revolution. Then for 45 deg. of travel the charge within the cylinder is expanded, whereupon the inlet ports are uncovered and remain open for 40 deg. of cylinder travel, 20 deg. on each side of the inward dead center position.

Originally the Gnome engine was provided with an inlet valve located centrally in the piston head and operated by the swinging motion of the connecting rod. This arrangement had the disadvantage that when anything happened to the valve or to its spring it was necessary to take the whole engine apart in order to remedy the defect. The construction above described was then evolved and has proven a great improvement.



Unusual timing of the Gnome engine, in which the exhaust valve remains open for more than a complete engine revolution

As now manufactured at Long Island City the Gnome motor has nine cylinders of 110 mm. bore and 150 mm. stroke and develops upward of 100 hp. at 1200 r.p.m. Both the speed and the brake mean effective pressure are low as compared with stationary cylinder engines, and the high weight efficiency therefore is almost entirely due to the highly refined design of every part of the engine. At a speed of 1200 r.p.m. the piston speed is about 1180 ft. per minute and the brake mean effective pressure figures out to 84.5 lb. per sq. in.

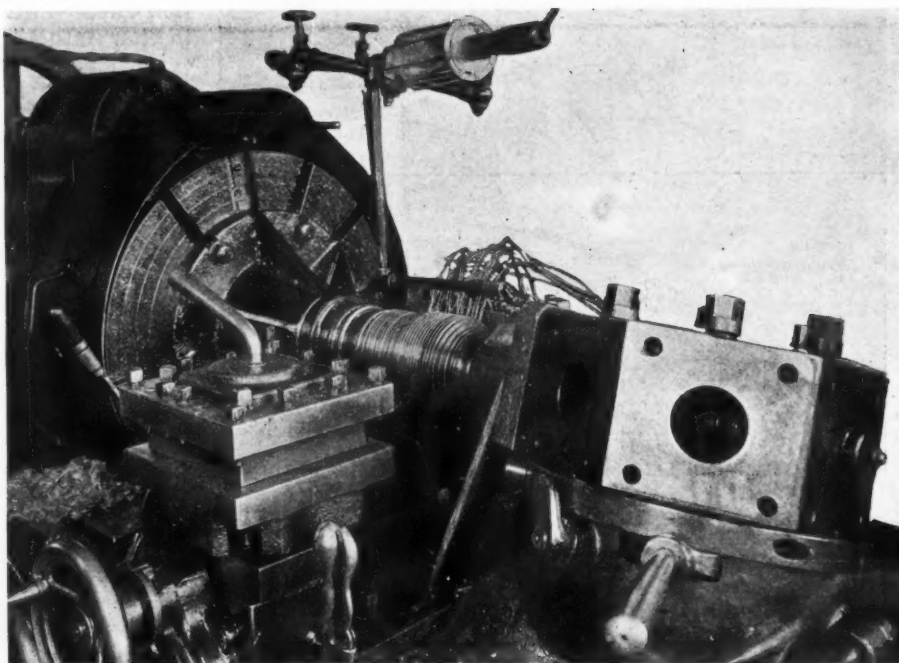
Much interest attaches to the method of manufacturing the various parts and the measures taken in order to secure a high degree of accuracy in machining, with complete interchangeability of parts. Although so far the demand has been for only a limited number of engines, a very elaborate system of tools and fixtures has been worked up by the General Vehicle Co. for the production of this engine. Such extensive tooling-up is especially difficult under the present conditions in the machine-tool industry. It is probably not far from the mark to say that in order to produce an engine similar to the Gnome on a manufacturing basis it is necessary to invest approximately \$250,000 in tool equipment, and the time required to tool up will not be less than 3 months and probably considerably more.

#### Cylinders from Solid Billets

The nine cylinders of the Gnome engine are each produced from a solid billet 6 in. in diameter, which is sawed from a hammered bar of that diameter, to a length of 11 in. This block originally weighs 88 lb., and in the course of the machining it is finally "whittled down" to about 5½ lb. The first operation consists in drilling a 2 1/16 in. hole through the block, an operation which requires about 14 min. Next the block is bored out to 2 5/16 in. In the next operation the cylinder is bored out to approximately 3 15/16 in. diameter and at the same time turned down over about one-half of its length (the inward or bottom end) to about 5½ in. diameter. After being rough turned and bored, the cylinders are heat treated, to facilitate the turning of the fins, which requires physical qualities of the metal indicated by a fine grain in the fracture. Then another boring cut is taken, which completely finishes the combustion chamber. At the same setting the outside is turned to the outline of the cooling fins and of the clamping flanges at the inward or bottom end. Next the cylinders are put in a fixture in which they are located by the bore and are inserted in a Gisholt lathe in order to turn out the top end, where the exhaust valve cage goes.

#### Rough-Grooving for the Fins

The next operation is the rough-grooving for the fins, which is done on a lathe with a multiple cutter head, as shown in one of the illustrations herewith. There are thirty fins on the cylinder, of varying height, according to the amount of heat to be disposed of. The center to center spacing between all fins is 6 mm. or about ¼ in., the fins are 0.60 mm. thick at the top, 1.40 mm. at the bottom, and 16 mm. deep. Next the first nine fins at the



Cutting the cooling flanges on the cylinder. This is a very delicate operation, as the finished flanges are only 1/16 in. wide at the bottom and 5/8 in. high

outer end of the cylinder are finish-turned and after this operation is completed a hole is drilled through the cylinder wall and the fins near the top of the cylinder for the insertion of a steel plug, which serves as a boss for the spark plug. This drilling operation involves some difficulty, owing to the fact that the drill has to pass through and cut away a portion of several of the fins.

In order to facilitate this drilling operation use is made of a lead casting, cast with grooves exactly conforming to the shape of the finished fins. This is placed in position over the fins, the center for the hole is then located and the hole drilled. The first time this drilling device is used the drill, of course, cuts through the lead as well as the steel, but each of the lead blocks is made to do for several drillings. After the hole has been drilled a solid steel block of the proper diameter and with its inner end shaped to conform to the curve of the cylinder bore and head is inserted. A groove is then cut around the inner end of the plug and the plug is welded in position by means of an oxy-acetylene torch. When the welding operation is completed and the cylinder has been cleaned off, it is subjected to an air pressure of 100 lb. to the square inch in order to test the airtightness of the valve. The cylinder block is clamped down to a surface plate and the air pressure is applied through a connection made in the center of the head. Soap suds are applied to that portion of the cylinder around the spark plug boss, and if there is any leak in the welded joint bubbles will form.

#### Fins Finish-Turned

Next the other twenty-one fins of the cylinder are finish-turned. The cylinder is held for cutting and finishing the fins on an expansion arbor, consisting of a hollow cast iron cylinder which is saw-slotted lengthwise from both ends. Conical shaped blocks enter this expansion member from both ends and are forced into it by turning up on a nut. The cylinder is then sent to the lathe, where a thread is cut in at the top end where the exhaust valve cage goes. This thread is 85 mm. in diameter and of 1½ mm. pitch. Next the cylinder is finish-bored ready for grinding. For the final boring operation the cylinder is screwed on to a threaded face plate. The boring bar is guided in the head stock and



the free end of the cylinder is guided between rollers on a steady-rest. The lower end is then finish-turned, the spark plug boss is drilled and tapped and then a key is milled in the top end whereby the exhaust valve cage is located. In order to locate this integral key, the spark plug hole is first tapped and a plug with a pin on it is inserted. This pin locates a template which is placed over the inward flange in the top of the cylinder, and the key is then scribed off and the rest of the metal of the flange is removed by milling.

#### Securing Cylinders to Crankcase

The next operation consists in drilling the port holes through the cylinder walls near the lower end. There are fifty of these holes, of 5 mm. diameter each, and they are spaced evenly around the cylinder. It will be seen from the sectional view of the engine that the cylinder projects a considerable distance into the crankcase. Instead of being provided with a flange at the bottom and bolted and doweled to the crankcase, as is the conventional practice, the cylinders of the Gnome engine are turned with three substantial flanges near their bottom end and are clamped between the halves of the crankcase, which is split in the plane of the cylinder axes and formed with nine cylinder bosses which are machined on the inside to conform to the lower portion of the cylinders. The clamping portion of the crankcase cylinder boss engages between two flanges on the cylinder at a considerable distance from the inner end of same, and in addition there is a guiding or steadying flange on the cylinder, close to its inner end. The inlet ports in the cylinder wall are directly below the clamped portion of the cylinder, and as the gas has to pass from the crank chamber through the annular space between the cylinder and the wall of the cylinder boss of the crankcase, it is necessary to cut slots in the guiding or steadying flange in order that the gas may pass through. This is the next operation performed on the cylinder, and at the same time a key way is milled in the flange on the cylinder, for a key to maintain it in the proper angular relation to the crankcase.

#### Grinding the Cylinders

The next operation is the grinding of the cylinders, and this is followed by the milling of the slots in the lower end of the cylinder in which the connecting-rods swing. The cylinders are then polished on the outside between the fins and over their entire surface. This is

done by means of a piece of emery cloth wound around a wooden stick.

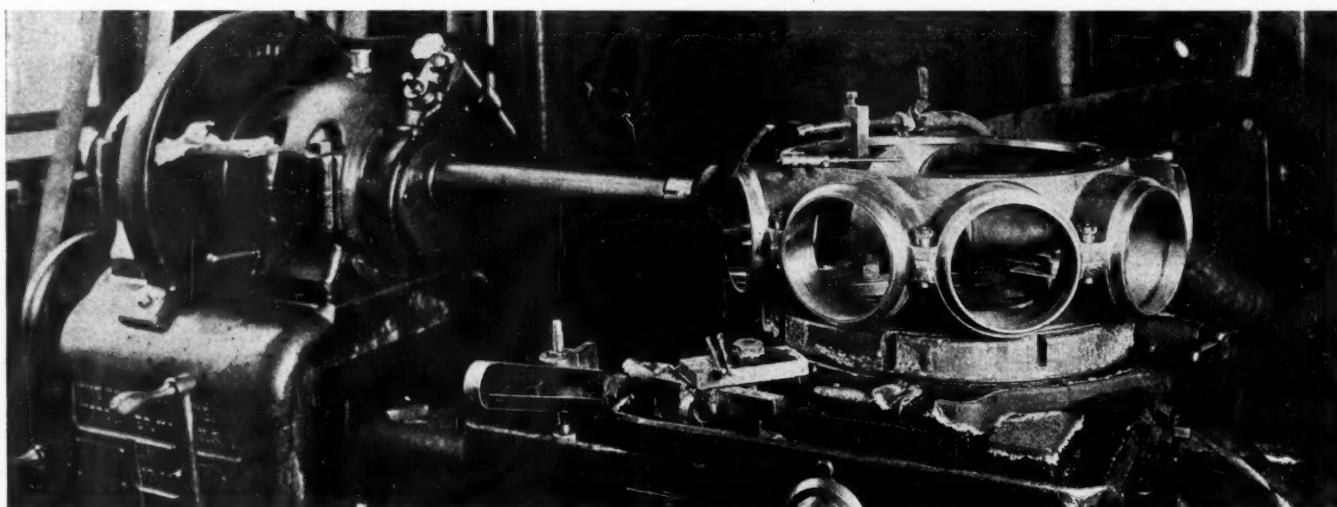
As an example of the tolerances allowed in the machining of the engine it may be stated that the limits for the cylinder bore (which is obtained by grinding) are 110.00 mm. minimum and 110.02 mm. maximum, which is a tolerance of less than 1/1000 in. The outside diameter of the cylinder wall at the bottom of the fins is 113 mm. in diameter, which makes the wall thickness  $1\frac{1}{2}$  mm. or less than 1/16 of an inch. Other parts of the cylinder that have to be finished to close limits are that portion where it is clamped in the crankcase and the outside diameter of the guiding flange. The limiting dimensions for the diameter of the former are 114.99 and 115.01 and those for the latter 125.95 and 125.96. These last mentioned dimensions give the tolerance of less than one-half of one-thousandth of an inch. Another dimension that is very closely limited is the width of the clamping belt, for which the limits are set at 14.99 and 15.00 mm. On almost all other dimensions of the cylinder the tolerance is 0.05 mm.

After the cylinders have been completely machined they are weighed and equalized in order to make them balance.

#### Machining of Crankcase

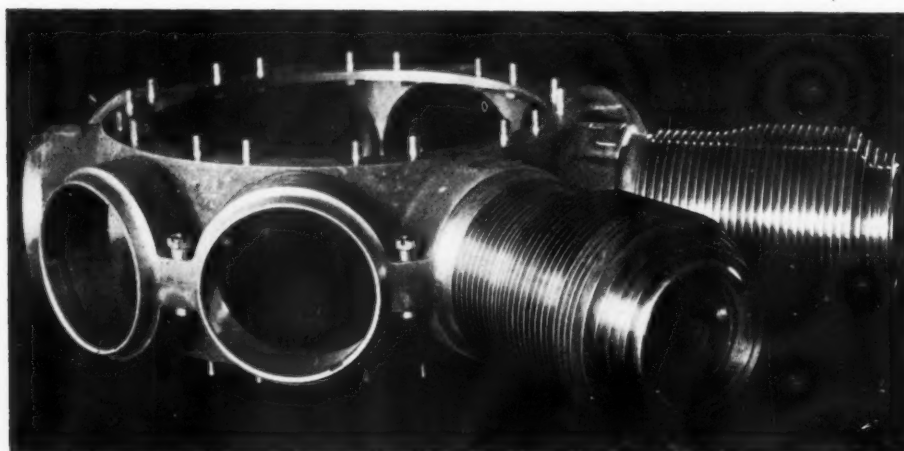
The crankcase is made in two similar forgings. While both forgings are made in the same set of dies, they are later made into male and female members by turning one with a circular flange and the other with a groove, so they may be accurately fitted together. Here again some examples may be given of the accuracy of the machine work required. The nominal bore of the crankcase is 310 mm. and the limits for this dimension are 309.99 and 310.03 mm. The overall width of the crankcase between the two outside faces is nominally 144 mm., and the limits are 143.98 mm. and 144.02 mm. Each half of the crankcase, however, is machined separately and the limits for its width are one-half of the above figures.

Upon the receipt of the crankcase forgings they are first annealed and—if necessary—straightened. They are then rough-turned on the faces of the joint and on all the other interior surfaces, except the cylinder holes. At the same time the flange and groove for the male and female joint are turned on, which is done in a Bullard vertical lathe. Now the halves of the crankcase are clamped in a fixture in which they are located by the bore and the wedge-shaped spaces between cylinder



Grinding the cylinder hubs of the crankcase. This is one of the operations that require the highest degree of accuracy, as the cylinders must be firmly held and yet not distorted





Two of the cylinders clamped in the crankcase. This illustration also shows the keyway in the crankcase holding the cylinders in the correct angular position, and the studs in the crankcase flanges by which the end plates are secured

bosses at three equidistant points. The forging is raised sufficiently from the fixture to permit of facing off its under surface. Next the holes are drilled in the flange where the end plates are fastened to the crankcase by means of studs. The jig for this drilling locates the part by the bore and by means of plungers entering between three sets of cylinder bosses. It may be pointed out that what is known as the thrust side of the crankcase is made the male member, and the distribution side, on which the cam gearing is located, the female member. The next operation consists in drilling the holes for the cylinder clamping bolts, which are 10.1 mm. in diameter and are reamed to this size. There is, of course, one of these between each pair of adjacent cylinder bosses. The nuts on these bolts are secured by split pins, while those on the studs for the end plates are secured by means of spring washers.

The halves of the crankcase are then put in the boring mill on a special fixture and have the cylinder bosses bored out, turned off on the outside and faced on the end. For this operation they are located by the clamping bolt holes. Four grinding cuts are taken in this one setting, including the internal grinding. Next the bottom or outer flange on the crankcase, to which the end plates are to be bolted is trued up in a Blanchard grinder. The case then goes back to the Bullard lathe, where it is strapped down by the outside and has the three inner surfaces finish-turned. Then the halves go to the bench where they are assembled into complete cases. The clamping-bolts are put in at the same time and the holes for the dowel pins drilled.

#### Boring the Cylinder Bosses

Next the crankcases are placed on a special indexing fixture in a Lucas boring machine for boring the cylinder bosses. The boring bar for this operation is supported inside and outside the work and is floated in the spindle of the boring mill, so that an absolutely true bore results. In this operation the cylinder bosses are rough-bored for grinding and at the same time they are finished on the outside by means of a tool which may be described as a three-cutter hollow mill.

Following are the limits to which the cylinder bosses of the crankcase are ground: The bore in the cylinder clamping portion, 114.97 mm. minimum and 114.99 mm. maximum; width of clamping belt, 14.99 mm. minimum and 15.01 mm. maximum. That portion of the cylinder boss between the clamping belt and the guiding flange is ground to 126.00 mm. minimum and 126.02 mm. maximum. The grinding is done on a grinder provided with

an indexing fixture, and both the 115 mm. and 126 mm. holes are ground at the same setting. After these holes are ground the roundings of the cylinder clamping belt are made by means of a special bar in the boring mill, the tools being fed out by means of a milled collar gripped in the hand and held from rotating.

#### Cylinder Clamping Limits Close

The cylinder clamping portion of the crankcase is one of the parts of the engine requiring the very closest limits, for the reason that the cylinders must be held absolutely rigid and at the same time must not be distorted, as that would prevent the free reciprocation of the piston inside the cylinder. In order to make sure that there is no distortion of

the cylinder due to the clamping action, a plug gage is inserted in the cylinder from the open end. If this shows the absence of any distortion, a bar 3 ft. long is screwed into the outer end of the cylinder and a test is made to determine any looseness in the joint between the cylinder and crankcase.

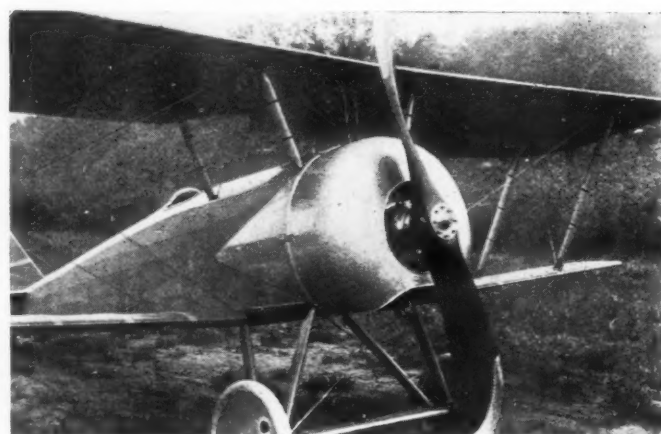
(To be continued)

### Motorcycle Side-Car Gun Mount

A MOTORCYCLE side-car machine gun mount, operated by Lieut. S. T. Kellogg of a motorcycle platoon at Bridgeport, Conn., has recently been inspected by War Department officials. Lieutenant Kellogg drove the machine over the road, stopping at various cities en route to explain the operation of the mechanism.

The entire outfit weighs 750 lb. The gun works on a double pivot. The operator sits on a saddle, which is on a pivot, while the machine gun is mounted on a second pivot, each one being independent of the other. There is also another pivot for pointing the gun upward for aircraft. The gun is so mounted that provision is made for an armor plate on the front to protect the operator of the gun. The gun can be fired from the front or the side position, or the rear, if necessary. This is accomplished by raising the arm that swings it over the side-car wheel.

The machine also carries an extra regulation tripod for trench work or arm which can be detached and carried on the platform and a gun-mount set on a pedestal for long-distance travel. A Colt automatic gun is used. The machine was designed and built by Lieutenant Kellogg, who explained the workings of the outfit to ordnance department officials on his arrival in the National Capital.



100-hp. Gnome engine in Thomas-Morse speed scouting plane

# Truck Builders Must Get Together

From Assemblers Army Will Buy Only Standard Trucks—Truck Firms Must Support Parts Makers

By A. Ludlow Clayden

**E**VERY man with a stake in the truck industry should be at Columbus, July 20, when Captain Britton of the Quartermaster's Department of the Army will preside over the final meeting to settle the last details of the Class A military truck.

*Captain Britton has announced in the most positive terms that the government will buy only standard assembled trucks, in addition to fleets from the old-line makers. No individual design assembled trucks will be bought.*

This means that the standard designs now being evolved for the War Department by special committees of parts makers, truck assemblers and S. A. E. members generally will be put on a level with other government standard articles. An assembler will not be asked to quote for so many trucks of his own design with his own name on them, but will bid for so many Class A or Class B military chassis, just as he might bid for so many standard wagon bodies or so many army tents.

## Specifications Unchanged

The specifications already issued will positively not be changed. The standard chassis now being perfected are being designed in accordance with those specifications, just as Pierce, Packard and other of the old-line makers have individual designs to suit the specifications. The army will use trucks of five or six designs. They will buy first from the old-line makers, giving each a substantial order. Then, when the assemblers and parts makers are ready to produce standard trucks all practically alike orders will be distributed, and the smallest producer will be able to come in with the largest.

In 2 weeks the greatest constellation of stars in the transmission field have got together and designed one ideal transmission for the Class A truck, which they will all make, alike even to the tolerances. The axle makers are not far behind, nor the motor builders and others. These men have worked together and been got together under the auspices of the S. A. E., to which body great credit is due; but the job is not a matter of S. A. E. standardization, it is government work purely, the S. A. E. machinery being used for its performance.

Now the parts makers can do their share, but they must have the help of the chassis men to consolidate it.

July 20, at the University of Ohio, Columbus, will see the completion of Class A. It is the time when the help of the truck engineers is most urgently needed. They must be there.

Nor is it the engineers only that are wanted; there are many commercial matters, too; the meeting is of a sort that the chief executives should attend. *No president of a truck company which wishes*

*to help the government in the present crisis can afford to be absent, and with the president should come his department heads.*

There has never been so big a thing as this done in the annals of engineering. Possibly it is the very bigness that makes it so difficult for every one to grasp just what is happening. The impossible is being accomplished. The evolution of these standard military trucks will have an immense and lasting effect on the industry. It cannot be thought for a moment that truck assembling will ever again be precisely the same as before. We have now a gear-set designed by the combined brains of all the leading transmission makers, a concentration of engineering skill on one article that has never before been approached. We are getting similar concentration on other articles, on other parts. These parts are the best the American industries know how to make. They are good for much more than military purposes alone. Class A gearsets will be purchasable in future in the same way as bolts and nuts are purchasable to-day. So with springs, so ultimately with engines, so with other things. It means a change so great and so sudden that the mind refuses to grasp it.

Things have gone far beyond what was at first anticipated. The War Department did not expect such wonderful co-operation; nobody expected it; it just grew and grew as the men got together and slowly grasped the immense value of the standardization and grasped the immense power they held to help the nation.

## Delay Means Loss of Lives

All Washington is talking about this work. Even the aircraft progress, wonderful as it is, also, has paled a little in comparison with the accomplishments of the truck industry. The spirit of the thing cannot be realized except by participation. That more of the right men were not at Washington, June 27, is regrettable; that more were not at Columbus, July 9, is shameful. Granted the notice given was short, granted that work has not been held up to enable polite letters to be written to all, this is no time for the ordinary usages of society or business. To-day every minute of delay on work of national importance is paid for in *lives*. For every hour of delay men will die sudden and horrible deaths. This is true; the connection is dim, it is hard to realize, but it is TRUE! To hold back, to stand on dignity, to scoff, to refuse to realize urgency, is equivalent to signing the death warrants of many noble men.

It is with such thoughts as these that the *big* men of the truck industry should, nay, **MUST**, come to Columbus, July 20.



# Evolve Army Truck Standards

Parts Makers and Truck Engineers Settle Many Details of Design for Class A and B Military Vehicles in 2-Day Session at Columbus

COLUMBUS, OHIO, July 10—The main features and dimensions of the Class A military motor truck were brought much nearer to finality at a large meeting of part makers and truck engineers at Ohio University yesterday and to-day. Discussion was mainly on details of points covered at Washington ten days ago. The work done in the interval by the committees has disclosed no unexpected difficulties. At present, the work on the engine is practically complete. The transmission manufacturers have agreed upon a design in which all details are precisely alike, even to tolerances. Axle standards are almost complete. Radiator designs are in progress and springs completed.

## Over 100 in Attendance

Over 100 were present when Chairman J. G. Utz opened the meeting. Captain Britton and H. L. Horning supported the chairman and members of council. McKinley and Riker also sat at the table. In opening the meeting, Utz said that the purpose and method of the work had been best explained by the editorial in THE AUTOMOBILE last week. The main object of the Columbus meeting was to co-ordinate the work of the divisions which had been evolving the various parts. He called for the report on the engine first.

H. L. Horning said that everything was in excellent shape, radiator standards could not be proceeded with till Captain Britton had completed tests which were to show whether or not a cowl or shroud surrounding the fan was desirable. If it was, it meant the use of an extra long hood. It was important for the sake of engine layout that the steering gear be located behind the support arm of the crankcase. There were reasons against this, but the importance of having engines interchange overruled them.

Chairman Copeland of the transmission division said its members had worked out fifty different designs and were now agreed on a layout with both shafts in one horizontal plane and the reverse idler above. This gave a very shallow box, the bottom being  $4\frac{3}{4}$  in. only below shaft centers, and the top would thus come  $\frac{1}{2}$  in. above the chassis frame.

## Gearset Drawings Practically Complete

Drawings of the complete gear set will be finished this week. The gate for lever positions will be the society standard with the reverse slot on extreme left lever moves back for reverse. The lever and control will have to be built up with the clutch cover, which is a sort of bell housing for the clutch alone, because the transmission will have to be too far back in the frame to permit direct lever attachment. The clutch has not yet been tackled but presents few problems.

Then followed a statement that the steering gear makers were satisfied that they can meet all requirements. A rather fierce discussion took place as to whether the same gear could be used for both A and B trucks, the conclusion being that it was entirely impossible. Then it was

found that the combination of  $58\frac{1}{2}$ -in. front wheel tread did not allow enough lock with the drag link suitable for the steering layout, so the axle makers agreed to increase the tread to 60 in. The length of steering column and method of finishing the rim of the wheel remain undecided; on the last point the gear makers consider wood the best material, but Captain Britton wishes it made waterproof, if practicable.

The springs division reported unanimity on every spring detail so much so that any leaf would interchange with any other of the same length by whoever it might be made. Fronts will be 42 in. long, divided 20 front of center and 22 behind,  $2\frac{1}{2}$  in. wide. Rears are 56 in. long, divided in center. Whether rears are  $3\frac{1}{2}$  or 4 in. wide is under discussion still. Fronts will have a deflection rate of 1 in. for 750 lb., and rears of 1 in. for 900 lb.

The only really troublesome matter which came up was to find means to satisfy the War Department's wish that worm and internal gear axles should interchange. Owing to the great difference between the location of the rear universal with the two types, it was found impossible so to locate the transmission in the frame that the propeller shaft joints would not be asked to work at unsafe angles when the truck was unloaded. For worm axles, a parallel placing of the transmission gives a straight line drive with the internal gear. The gearset must be sloped so as to transfer some of the angularity to the joints in the shaft between the clutch and set gear. It is now thought likely that packing blocks can be used so as to tilt the transmission when an internal gear axle is employed.

## Hotchkiss Drive Approved

The effect of spring action on brake connections proved another difficult point and is not finally settled yet. It was decided by an unanimous vote, with Captain Britton's approval, to adopt the Hotchkiss drive as standard, since this removed some of the axle makers' troubles.

Monday's proceedings closed with the acceptance of the society's standard No. 3 flange mounting for starting motor without board, Bendix mounting and thirteen teeth, 8-10 pitch. To-day a few details of Class A trucks were taken up and a general discussion of Class B work followed.

There was a somewhat smaller gathering to-day, still over fifty were present. The broader specifications for Class B trucks were the subject, and enough was blocked out to enable the different committees to get ahead. It was agreed to meet again at the Ohio University Building, Columbus, July 20, this to be for the final approval of Class A before it goes to the War Department, and for the discussion of the Class B design in the intermediate stage.

That the design for Class B will be strongly similar to that for Class A is settled. The adoption of Hotchkiss drive was agreed upon, a little argument arising as to the length of spring which should be adopted, a point which was not finally settled.



The meeting then broke up into sections to get started on detail matters, each division handing in brief written reports to Cornelius T. Myers, who is doing the work of laying out chassis with the different standard parts recommended. There was every indication that Class B would prove a simple job after the experience gained in evolving Class A.

The few truck makers present held a short meeting to talk over a few points which will obviously arise, and it was the sense of this small gathering that the chassis

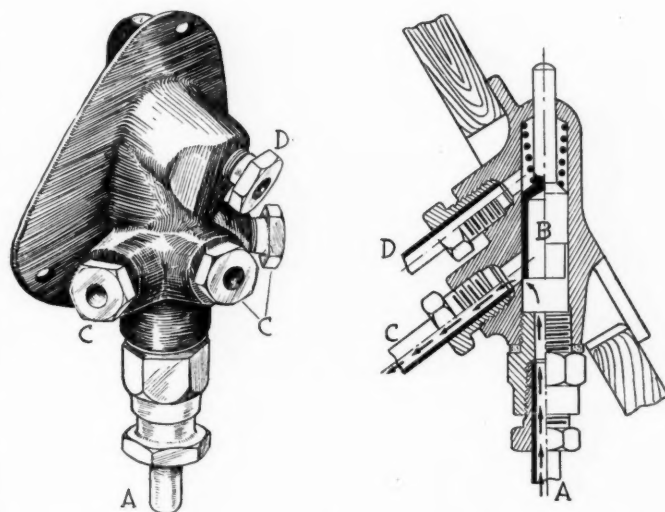
assemblers would have to regard the production of military trucks from a different standpoint from that of their regular business. It seemed best to consider the standard truck in the same light as any other standard article for which the government asks contracts, such as tents or wagons. Thus, instead of offering to supply military trucks under a maker's name, it is possible that no names will be used at all, the manufacturers simply tendering for so many Class A or Class B standard vehicles.

## Janusch Oil Circulation Indicator and Distributer

**A**N oil circulation indicator and distributer adapted for use on automobile, tractor and airplane engines is being marketed by F. Janusch's Machine Shop, 509 Roscoe Street, Chicago, Ill. A patent on this device is pending. It is made either as an indicator, in which case there is only one outlet, or as a combined indicator and distributer, in which case there are several outlets. At the present time indicators with a single and with three distributing outlets are ready for production and may be mounted either on the toeboard or the instrument board.

This device indicates the flow of oil by means of a piston rod in view of the driver, which rises more or less according to the rate of oil circulation. It is claimed that the smallest circulation will be indicated, irrespective of the pressure causing it. In one of the first models designed the indicating rod rose  $\frac{1}{8}$  in. for very slight circulation, and with any increase in flow it rose an additional  $\frac{3}{16}$  in. When the flow stops the piston entirely disappears.

Referring to the sectional view, the operation of the device is as follows: Oil enters the distributer at A and flows into the distributer chamber underneath the piston B. The latter is ordinarily forced down against the inlet plug by a coiled spring, but the pressure of the circulating oil causes it to rise against the pressure of the spring and uncover the distributer openings of which there may be one or more. The distributer outlets are shown at C. The piston is provided with an extension or piston rod passing through a hole in the top of the distributer. When no oil is flowing this extension is entirely within the distributer, but when oil passes through, the ex-



Exterior and section through Janusch oil circulation indicator and distributer

tension protrudes from the distributer for a distance of  $\frac{1}{8}$  in. or more. The outlet D from the top of the distributer chamber takes care of any oil that leaks by the piston, returning it to the oil sump or supply tank.



Rear view of Royal truck attachment mounted on a Ford chassis. The Ford axle becomes a jackshaft. The entire unit sells for \$350

## Royal Truck Attachment for Fords

**A** TRUCK attachment for Fords, selling for \$350, and providing a truck of  $1\frac{1}{2}$  tons capacity, is manufactured by the Royal Motors Corp., Detroit, Mich.

The frame is pressed steel, and bolted over the Ford frame, which forms a sub-frame for the attachment. The Ford axle becomes a jackshaft, and chain drive sprockets are attached in the same manner as the original Ford wheels.

Platform spring suspension features this attachment. A transverse spring, bolted to the rear crossmember, transfers the load to two semi-elliptic springs resting on the dead axle. The former spring has five leaves, the latter, twelve each. This suspension is said to reduce vibration, and thereby to greatly promote the life of the assembly.

### Rear Wheels of Truck Type

The rear wheels are of truck type, mounted on heavy duty roller bearings, and fitted with 32 by 4 in. solid Firestone tires. The transmission brake is disconnected, and the service brake transferred to the rear axle. The emergency brake is left on the jackshaft.

This unit weighs 875 lb., and can be furnished with any desired body. Immediate deliveries can be made to dealers, and preparations are under way for a large production.

# How United States Builds for Air Supremacy

Aircraft Production Board of Council of National Defense Compactly Organized for Intensive Development of Quantity Production of Engines and Planes

Co-operates with Army, Navy and Manufacturers—  
Establishes Expanding System of Aviation Schools

"AMERICA'S greatest contribution to the war will be aircraft and aviators. We believe that, once started upon quantity production, American mechanical genius will overcome any present obstacles to the progress of the art." Such is the opinion of a prominent British general, which is being indorsed and put into effect by the Aircraft Production Board of the Council of National Defense. The United States is planning to build 22,625 airplanes, at the rate of 3500 a month, with the proposed appropriation of \$639,000,000 for aviation in bills now before Congress; and this is to be but a starter in America's fight for the supremacy of the air. Quantity production and standardized types are the means which the board will use to achieve its aim. The board is composed of Howard Coffin, chairman; Brig.-Gen. George O. Squier, chief signal officer of the army; Rear Admiral Taylor of the Bureau of Construction of the Navy Department; E. A. Deeds, former general manager of the National Cash Register Co., and later with the Dayton Engineering Laboratories Co.; R. L. Montgomery of the Philadelphia firm of Montgomery, Clothier & Taylor; S. D. Waldon, formerly vice-president of the Packard Motor Car Co.; and A. G. Cable, executive secretary.

The board will co-operate with the plane and engine design departments of the army and navy, and of all other companies and organizations working to advance the science of aviation and aerostation. It will advise and assist in the standardization of materials, parts, and types of aircraft. It will investigate the source of supply of aircraft and materials of all kinds, with the aim of enabling the Government to purchase all kinds of aircraft of the types and in the quantities desired. It will also aid in the financing of large-scale production where larger contracts are considered than can be privately financed. It will endeavor to perfect a standardized system of inspection. It has provided aviation schools, and will continue with their development. Plans are now under way for the erection of twenty-four aviation fields. An endeavor will be made to secure priority of deliveries of aircraft material, in accordance with the general policy as determined by the Council of National Defense.

The Aircraft Production Board will co-operate with the recently created joint Army and Navy Board in design and specifications, which has been entrusted with discretion on all questions of design and specifications in all forms of military aircraft, except Zeppelins. The membership of this joint board includes the following: Major B. D. Foulois, U. S. A.; Capt. V. E. Clark, U. S. A.; Lieut. A. K. Atkins, U. S. N.; Lieut. J. H. Towers, U. S. N.; Asst. Naval Constructor J. C. Hunsaker, U. S. N.; Capt. E. S. Gorrell, U. S. N. Major Souther, the consulting engineer of the Signal Corps, will act in a similar capacity to the aircraft Board.

## Standardization the Solution

The whole answer to the problem is standardization. The American development of the airplane engine will be a standardized engine. If necessary, parts exactly alike will be turned out in quantity in one factory and shipped to a different place to be assembled. A large percentage of the first machines will be training planes, both because these are needed first and because it will take time to turn out the tools, dies and gages necessary to manufacture

in quantity battleplane models developed by nearly 3 years of war. In 4 to 6 months, however, battle-machine motors will be turned out in quantity.

Any manufacturer who devotes his time to turning out an especially efficient type of airplane which does not conform to the standard will be wasting his effort, for the Government cannot afford to spend its time and money on specialized designs which can be turned out with greater efficiency in France, where the speedy battle types have been developed. The job for America is to produce training planes and battle types in vast quantities.

## Helping the Manufacturer

Plans are well developed for the program of the first year's work, which will involve the turning out in American factories of thousands of airplanes, including both training and battle types. Arrangements have been made with British and Canadian officers to standardize the training machines in use in Great Britain, Canada and the United States, so that the machines can be distributed impartially and without difficulty among the three na-

## Aircraft Production Board Purposes

- 1—To assist in designing airplanes.
- 2—To standardize materials, parts, and types of aircraft.
- 3—To investigate sources of material supply.
- 4—To aid in financing large scale production.
- 5—To perfect a unified system of instruction.
- 6—To provide aviation fields and schools.
- 7—To obtain priority of delivery of airplane production materials.



tions. Negotiations are under way with the British and French manufacturers to secure the advantage of their experience and designs in spurring forward the development of our own industry. All reports that the United States intends to purchase airplanes abroad are manifestly false, since the Allies are constantly in need of more machines than their own resources can supply.

American manufacturers are now conducting successful experiments with both new and foreign types, and expect to have no trouble in developing motors of sufficient power and endurance for use at the front within a year.

Manufacturing equipment in many different industries will be utilized in the consummation of the building program. Existing airplane factories will be enlarged, and will be concentrated upon some one of the types of machines needed. Automobile and engine building plants, sewing machine and typewriter plants, woodworking and other manufacturing institutions, will be able to cooperate in this work. Orders are, of course, being given to all reliable existing airplane manufacturing plants capable of turning out the quality of machines which the Government must have, and these plants are all planning to expand their factories for more extensive production. In all the arrangements which have been planned the most intensive care has been given to the business form of the proposed contracts, so that while the firms which will be engaged in the manufacture of these machines will be assured of adequate capital to secure the expansion and adaptation of their plant, the nation will be pro-

ected against paying excessive profits through an undue stimulation of prices. The plan of turning to aircraft building the resources of many allied industries is not an experimental step, as it has been tried and proved satisfactory in France and England.

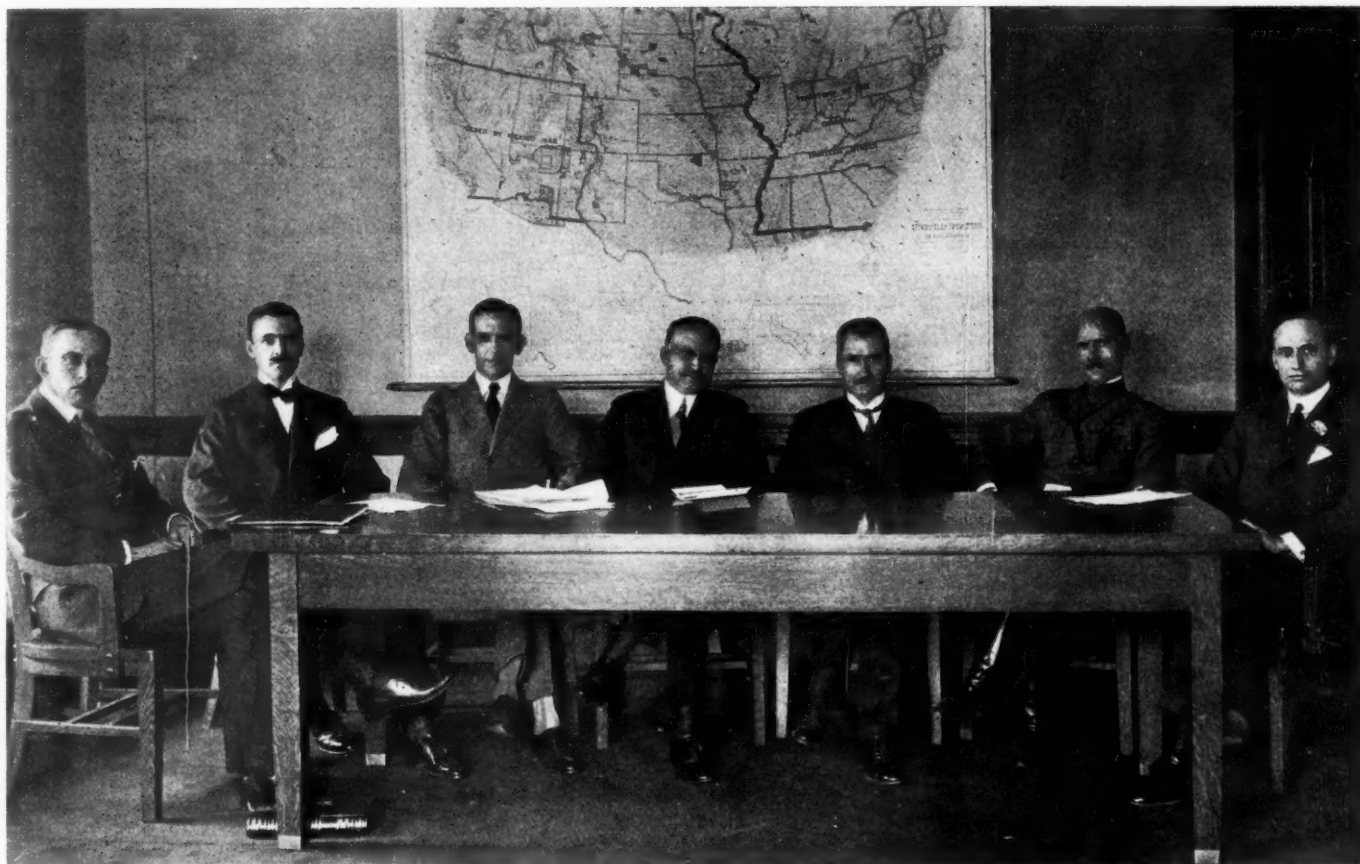
#### 24 Aviation Fields Planned

Twenty-four flying fields will be provided by the Government within the next year to accommodate the thousands of aviators who will be needed for the vast American air fleet. About nine aviation fields are already under construction. The largest of these is at Dayton, Ohio, which is 2500 acres in area, built to house four squadrons instead of the usual two, equipped with hangars which will house 144 airplanes, and provided with accommodations for 300 cadet students. About 1700 persons will be employed at this one field alone. Other aviation bases contemplated are San Diego, Cal.; Los Angeles, Mare Island, Cal., and Puget Sound, Wash. Work has neared completion at Rantoul Field, near Champaigne, Ill., and Selfridge Field at Mount Clemens, Mich. A contract has been let also for a field to be built at Belleville, Ill.

#### Thousands of Men Are Needed

Thousands of men are needed for the aviation service. Due to the fact that the requirements are extremely strict and a great proportion of the applicants are turned down, the impression has become widespread that the Government is not seeking aviators. This is far from

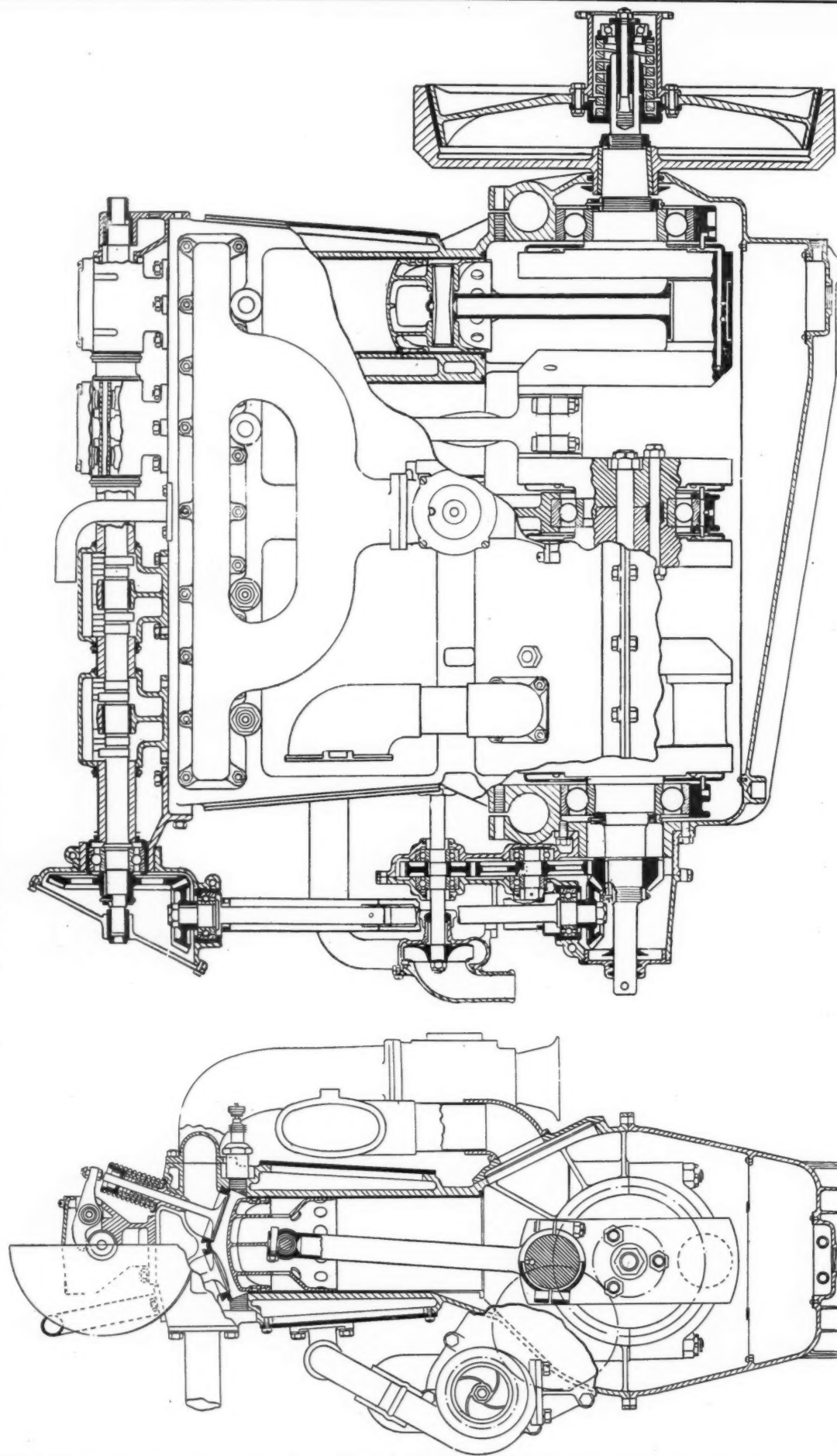
### Aircraft Production Board of Council of National Defense



Left to right: A. G. Cable, executive secretary; R. L. Montgomery of Montgomery, Clothier & Taylor, Philadelphia; S. D. Waldon, formerly vice-president of the Packard Motor Car Co.; E. A. Deeds, former general manager of National Cash Register Co., and later president of the Dayton Engineering Laboratories Co.; Rear Admiral D. W. Taylor of the Bureau of Construction, Navy Department; Brigadier-General G. O. Squier, chief of the Signal Corps of the Army; and Howard Coffin, chairman of the board



## FRONTENAC ENGINE DETAILS



*Showing the arrangement of the cast iron cylinder liners and valve seats in the aluminum cylinder castings, the large jacket plates at the sides and ends of the cylinder block, the tubular connecting-rods, ball-bearing crankshaft made in halves, overhead camshaft, double valve springs, bevel gear camshaft drive and other features*

being the case. The very fact that so many have to be refused for service makes the securing of aviators the more difficult. Instruction for aviation recruits began on Monday, May 21, and new classes have been begun on the Monday of each succeeding week. The Government can now use 150 to 200 new students each week, and this number can be rapidly increased. The Government has stated that it wants 1408 active airplane drivers by Sept. 8, and no good material will be turned away.

#### How to Apply

A prospective aviator should:

- 1.—Write to whichever of the following department headquarters is nearest his residence:  
Signal Corps, War Department, Washington, D. C.  
Mineola Field, Mineola, Long Island, N. Y.  
Essington Flying Field, Essington, Pa.  
Sam Houston, San Antonio, Tex.  
North Brothers Island, San Diego, Cal.  
Signal Officer, Central Department, Chicago, Ill.  
Fort Omaha, Omaha, Neb.
- 2.—Fill out the application blank, which will be sent to him.
- 3.—Appear upon notification before the examining board to take the physical, mental and moral tests required.

The aviator who successfully passes examinations is then sent to one of the army schools of aeronautics for the 8 weeks' course which is provided. Upon graduation he will then be sent to one of the aviation schools, where as soon as he has satisfactorily passed the flying tests his commission may be issued to him.

#### Subjects Taught at Government Schools

Six Government schools of aeronautics have been established at the universities of California, Texas, Illinois and Ohio, Massachusetts Institute of Technology and Cornell. Three technical instructors from each of these places have visited the Canadian aviation schools

where similar work has been given. These schools where the so-called cadets are trained might be described as laboratory courses in aviation. The students are given thorough instruction in the theory of flying, including the necessary physics and mathematics and the mechanics of airplane construction. The training schools are thoroughly equipped with airplane parts and instruments for demonstration as well as text books. Technical matters relating to map making, photography, bomb dropping, gun sighting and all similar subjects which a military aviator must know are also taught. During all this time the cadet is under military training, following the methods which Great Britain and Canada found successful. The schools can accommodate twenty-five new men each week. No distinctive uniform has as yet been supplied for the students, who for the time being are provided with a distinguishing band to be worn on the sleeve.

One attractive feature of the aviation work is the amount of the constructive and novel activity involved. The mysteries of sail making and splicing are revealed. Rigging and landing gear are explained in practical illustrations. High-speed photography is an important feature, as the driver must know when and how to get pictures of the enemy territory when zig-zagging over it at great speed. Map making is part of an aviator's daily task, and perhaps the most exciting lesson of all is learning to operate the machine guns so that he may know how to meet war in the air.

#### U. S. Aircraft Insignia

The United States has chosen the following insignia to be used on Government planes: A five-pointed white star imposed on a blue circumscribed field, with the center of the star red. The shades of red, white and blue will be the same as those used in the American flag. One of each of these insignia will be placed on the upper surface of each upper wing and one on the lower surface of each lower wing. The rudder in the rear of the rudder post will be painted with three equally wide bands, colored red, white and blue.

## Frontenac Aluminum Engine

### Cast Iron Liners Inserted Into Cylinders from Below—Valve Seats Dovetailed In

ONE of the most interesting of modern racing engines is that in Louis Chevrolet's Frontenac car, which has figured prominently in several racing events of the season. It really made its debut late last fall by winning the Uniontown, Pa., hillclimb. This engine is of the overhead camshaft type and has aluminum cylinders. Two sectional views which illustrate its internal construction appear herewith.

#### Liners Inserted at High Temperature

Cast iron liners of thin section are inserted into the cylinder bore to take the wear. These liners are inserted from the bottom and held in place by friction only. As they are introduced while the cylinders are maintained at a high temperature, by means of steam in the water jackets, they are automatically clamped tight in place at normal temperature when the cooling water is in the jackets instead of the steam. Also, as soon as the motor is started up under its own power the temperature on the inside of the cast iron sleeves rises so much higher than that of the water-cooled aluminum which surrounds them that the cast iron sleeves expand and tighten up inside of the aluminum rather than the aluminum expanding away from the cast iron sleeves.

As will be seen from the end section of the Frontenac motor, the seats for the valves are made up from iron castings with dovetailed edges cast in the aluminum. This makes the cast iron seats an integral part of the aluminum cylinder casting and has been found to give absolutely no trouble during the life of these motors, which has extended over a period of nearly 18 months. One piece is used for each group of four valves. By the use of these individual cast iron valve seats, the difference of the expansion of the cast iron and the aluminum does not affect the alignment of the adjacent cylinders.

#### 135 Hp. Developed

The dimensions of the motor are 3.875 in. bore and 6.375 stroke, making a motor of just under 300 cu. in. displacement. With 105 lb. per square inch compression pressure, it is possible to obtain 135 to 140 hp. from this motor, so Louis Chevrolet claims. It will be noticed that two valve sizes are employed, the intakes being made lighter and larger in diameter than the exhaust, as is clearly shown in the sectional drawing. The intake measures 2 in. in the clear, while the exhaust measures only 1 3/4 in.

# Navy Needs Inventors, Scientists and Engineers

36,000 Engineers Have Already Enlisted—Predicts That Sailor of the Future Will Be Required to Have Technical Training—American Genius Will Find a Method to Deal with Submarine Menace

By Josephus Daniels  
Secretary of the Navy

**EDITOR'S NOTE**—America must train men for the Navy in time of peace to be ready in war, said Secretary of the Navy Daniels before the Editorial Conference of Business Papers in Washington. He predicted that the day is near at hand when no man will be enlisted unless he knows something about electricity, machinery or radio, or shows some desire to be an expert along those lines.

I HAVE the distinguished honor to belong to the profession whose good reputation and good works you illustrate. I had a friend who was in this profession, working very diligently and thinking he was accomplishing much, and his young son came in one morning and said, "Father, the doctor is a very useful man; he cures you when you are sick; and the lawyer gets you out of jail when you have done wrong," and he went on to enumerate the occupations of men of real worth, and then said, "Father, is what you do any good?" I think if that inquiry could be addressed to every one of us, it would lift up our conception of the opportunity and privilege which comes to every man who is the head either in the business or the editorial side of the agency that makes and forms and conveys public opinion. If I were to follow my inclination, I would speak to you rather upon the duties of the press in this day than upon the place the Navy is to hold, for I believe that to the press belongs the great responsibility of letting the people know the truth about everything in connection with Government, and I wish you to know that the spirit of the Administration, as illustrated in the President's recent letter, is that comment and criticism are the very life of a democracy.

## Navy Represents the People

But I was asked to speak to you on the needs of the Navy. The first need of the Navy is that it shall not be regarded as an agency afloat—something powerful on the sea; the first line of the defense. It must be that, but it must be anchored in the affections of the American people. And men of the seacoast and men in the interior must feel that it is theirs and represents them, as indeed it does. The fathers who established the Navy and who provided the means for its conduct very wisely provided that its officers should come from every section of the Republic, and not only men accustomed to the sea should be invited to be trained as officers in the Navy, but from every Congressional district choice young men should be named who

would be trained to this service, and it chances that the greatest admirals in the Navy are men who went to Annapolis without ever having seen salt water, showing that the American youth is able to accommodate himself to all conditions, and to rise superior to the lack of early environment and training on the sea, which are popularly supposed to be necessary to make a great naval officer. The present admiral of the fleet is a citizen of Vermont, and he told me he had never seen a ship until he went to Annapolis, and we are training men of that type from all parts of the Republic, and they are carrying home the thought to the people that it is their Navy, manned by their boys.

## Men Are the First Requirement

The first need always of a navy is men. We may talk about munitions and dreadnoughts and submarines, but they are worthless without skilled and trained men, and you cannot make an officer or a seaman in a day. We must train men in times of peace to be ready in war—red blooded men, capable men—and I am happy to tell you this morning that when the call came for a new enlistment in the Navy, for a large increase, the young men responded so handsomely that we had to tell them they must stay at home a little while until we could get more ships.

A few days ago I spent the day with the fleet. You newspaper men must, of course, say: "The fleet is somewhere in the Atlantic." I cannot tell you where it is, but we spent the day on the fleet and the admirals and the captains were enthusiastic over the type of young men we are getting. There was a time when men came into the Navy who did not have electrical or mechanical or some technical knowledge or desire to learn in some branch requiring great skill. The day is near at hand when no man will be enlisted in the Navy unless he knows something about electricity and machinery or radio or is longing and showing some desire to be an expert along these lines.

## Navy Needs Ships

The second need of the Navy, of course, is ships, and I come here to say that we do not build a ship in a day. It is true McDonald felled the trees in Vermont, and on Otter Creek built the ships that won the war of 1812, in eighty days. We have not been able to build a dreadnought under three



years, so we must make provision early, and we are now employing every shipyard in America that can make a vessel for the Navy, overtime, to supply ships. It ought not to be necessary to be compelled to have an Act to commandeer ships; but while the spirit of nine-tenths of the American people who own tugs and yachts and other craft has been so patriotic as to give a thrill of satisfaction, we have found some men who had craft that we must have who declined to sell them at a fair and reasonable price, but when we obtain this legislation we shall then be ready to commandeer such ships as we may need, and put them in the service, paying 75 per cent of their value in cash, and then whatever difference may be between the Government and the owner will be settled according to law in the courts.

#### Must Have Ideas

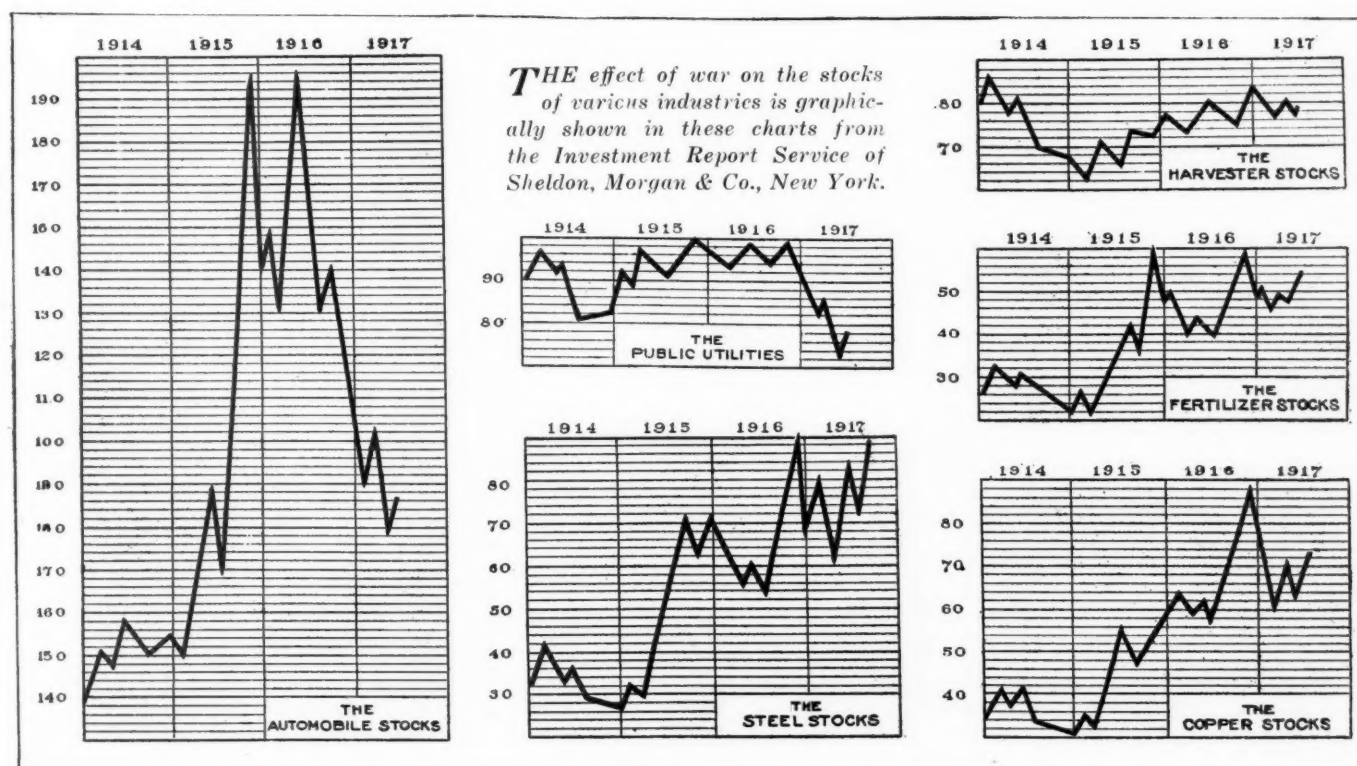
We must have ships, and in this day we must have ideas. We must have enlisted in the Navy not merely skilled officers and skilled men, but we must have inventors and scientists, and engineers, and I am happy to say to you that, responding to the call of the President, there are now enlisted 36,000 engineers in America in the Navy, and they are day and night testing and experimenting with new forms of offensive in war, because the American spirit is not willing to continue in war merely on a defensive line. We must contribute to the full in every way in this great war that is possible, but I have the hope—I have the faith, that we shall find a method to deal with this submarine warfare which shall follow the Farragut method of "Damn the torpedoes, go ahead."

You gentlemen have a large opportunity to serve also in this, and are serving, as is the business and banking world, in a patriotic way. Men with money who are too old for service are responding. A few days ago a gentleman said to me, who was furnishing large supplies, "I am too old to go in the trenches, but I would be ashamed of myself if I made more than a normal profit during this war on what I furnish the Government."

#### 100 Per Cent Efficiency Necessary

Let us get into the heart of the American people the spirit of that man—one of the richest men in America—in the heart of all business, that it will be a crime for any man to make more money out of this war than he makes in normal profits. The Navy needs, the Army needs, every branch of Government needs, that for every dollar of the Liberty bond issue expended we shall get 100 per cent of efficiency, and, to that end, I am glad to tell you what you already know, that citizens from all parts of our country are volunteering their services; men expert in all lines are coming to Washington and laboring with us in the Departments to put in touch with the Government the men who supply the raw materials, and the men who supply the munitions, and there is pending a measure in Congress for food control, which shall enable America to avoid the mistakes which our visitors from France and Great Britain freely admit were made in the early days of the war; and toward these ends you gentlemen can contribute. You have contributed, and no democracy can live and carry on its business unless a free press is in hearty co-operation with a free government.

### Automobile Stocks Fluctuate Widely in 4 Years



## 3000 Prospects in Guatemala

Only 150 Cars of All Makes in the Central American Republic—Medium Priced Automobiles in Most Demand—Has Many Good Roads



By  
Hamilton Wright

A street scene in Guatemala City. The oxcart is the principal vehicle of transportation

**A** VERY conservative estimate of the probable purchasers of automobiles in Guatemala would be 3000. There are to-day not more than 150 cars of all makes in the Republic of Guatemala. Of this number, 125 cars are in the capital, Guatemala City.

Guatemala is the most populous of the Central American republics, there being about 2,200,000 persons within its borders. Approximately 1,000,000 are Indians, 6000 are foreigners, persons of American or European birth. There is a scattering of negroes along the low, hot coast regions. The remainder of the population is composed of Guatemalans, who, like the Indians and foreigners, live on the high plateaus and tablelands of the interior.

The country has an area of approximately 50,000 square miles, about equal to the combined areas of England and Wales. The thickly inhabited portions of the country consist of high, almost level tablelands or plains, broken up by mountain ranges of varying elevations. Guatemala is progressing rapidly, and has 500 miles of first-class railroad. During the past 15 years the railway mileage has doubled.

The largest purchasers of automobiles in Guatemala to date are the Guatemalans. This is so since they are the most numerous portion of the inhabitants having money to spend. The term Guatemalans is applied to natives of Guatemala who are not Indians or foreigners. As a rule, the Guatemalan has some Spanish blood in his veins. He may be pure Spanish, tracing his descent from

the first Spanish colonists who came to Guatemala following the military occupation of the country in 1540, or he may trace his parentage to Mexico or a near-by Central American republic.

In his tastes the Guatemalan of the well-to-do or wealthy classes is essentially Spanish. He speaks Spanish, the language of the country, and, frequently, but little English. Education is compulsory. His home is often luxuriously appointed.

### Most Industries Run by Natives

Most of the industries and mercantile establishments are run by Guatemalans. There are probably 15,000 of this well-to-do or wealthy class who are able to buy automobiles, but who cannot be classed as probable purchasers, since the advantages of the automobile are comparatively unknown to many of them. The remainder of the Guatemalans are of the poorer classes.

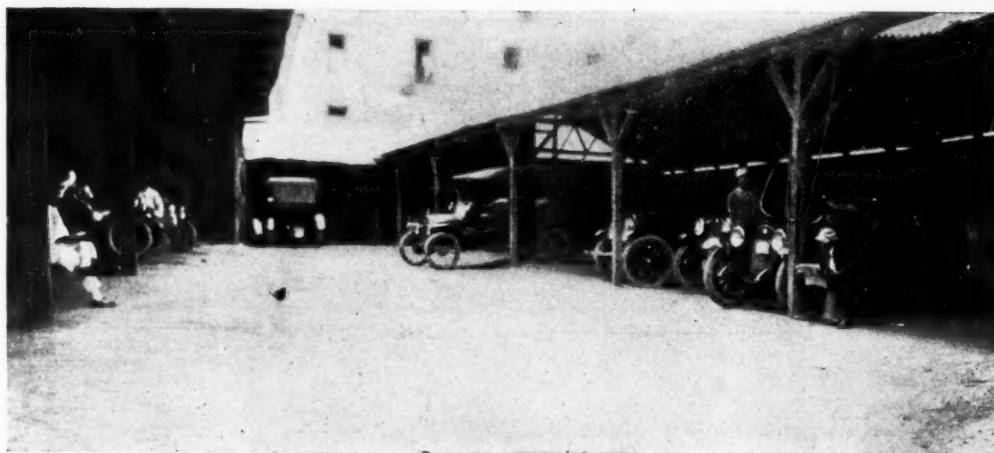
Of the 6000 foreigners in Guatemala, the Germans are the most numerous. They are largely interested in coffee raising. The remaining 2000 of the foreign population are comprised of Americans, Italians, Swiss, French, and other nationalities. Undoubtedly there is an opportunity to sell cars to this foreign population, a part of whom devote themselves to the cultivation of estates in the country. Owing to the nature of the coffee industry, which is the chief industry of the republic, the ownership of the coffee fincas or plantations is widely dis-



tributed, and owners of the different estates normally have considerable purchasing power. On some of the estates life is luxurious. Saddle horses and buggies, democrats and landaus are maintained. A good live agent going through the country could undoubtedly sell some machines.

The Indians, the most numerous of Guatemala's population, are not buyers. They live mainly by primitive agriculture and the carrying of burdens, and are only able to purchase the most meager necessities of life. In a large part of their transactions no money passes. They are found in thickly settled districts throughout the highlands, between altitudes of 3500 and 9000 ft. In fact, most of the population of Guatemala lives in the interior, between altitudes of 1200 and 8500 ft., the largest cities being more than 4000 ft. above sea level. At this elevation the climate is temperate and delightful. The people are active and vigorous.

Guatemala City, the capital of the republic, situated at an altitude of 4800 ft., has a population of 125,000 persons. Fair dirt and stone roads radiate from it in almost all directions, some of them being negotiable for automobiles for a distance of 90 miles. It should be pointed out, however, that the Central American does not use cars for touring as we do in the United States. The Guatemalan uses the automobile not so much for pro-



An open-air garage in the City of Guatemala

tracted tours as for drives around his home city. The automobile replaces the handsome carriage with its fine horses and its liveried drivers which in all Spanish countries was the insignia of distinction. This was no less true in the Philippines than in Central and South America. Visitors to the Philippines in the early days will recall the stylish carramatoes (rigs) in which of an afternoon it was fashionable to drive along the old Luneta, passing the time of day with one's friends. So will it be in Guatemala City when the automobile will be found to fulfill every social requirement.

In this connection there should be an opportunity to introduce the automobile hearse in Central America. In a recent tour of Cuba, Colombia, Panama, Costa Rica, Nicaragua, El Salvador and Guatemala, the writer saw the automobile hearse used in only one Spanish-American town—Havana, Cuba. Yet the highly decorated horse-drawn hearse, with its ornate lacquered designs, and drawn by a closely matched black team, often of four horses, must come at a figure equaling or exceeding that of the automobile hearse.

#### Guatemala Has No Motor Trucks

Motor trucks are not used in Guatemala. In Guatemala City the opinion was expressed that the streets would not support heavy trucks, as the sewers are close to the surface and the pavements are not built to withstand heavy traffic. Yet oxcarts are employed, and certainly on many of the streets trucks could be operated. In the dry season, from November till April, the roads in most of the coffee districts are most certainly able to support motor trucks. In different parts of the republic, in the coffee districts, I have seen fine, hard, level dirt roads extending over long distances. Along the International Railway, as it parallels the Pacific Coast, running along the lower tablelands, where the coffee plant flourishes, are many roads leading from the plantation to the railway stations, sometimes 25 or 30 miles distant. Yet oxcarts, and sometimes mule carts, are almost exclusively used in the transportation of the crop. An oxcart makes about 2½ m.p.h. One occasionally sees passenger automobiles along these roads,



Map of the republic of Guatemala, which has an area of approximately 50,000 square miles, or about equal to the combined areas of England and Wales. The topography of the country is characterized by tablelands broken up by mountain ranges. Coffee raising is the principal industry of the republic



Scene in Antigua, Guatemala. The city has been rebuilt since the eruption of July 29, 1773, that laid its stately palaces in ruins



The hamlet of Santa Maria, a way station on the stage route between San Felipe and Totonicapan. It is at an altitude of 5000 ft. and the road is one of the most picturesque in the world



A country road 28 miles south of Guatemala City



A bird's-eye view of a section of Guatemala City. The scene is one of restful dreaminess





In the highlands of Guatemala. This section of the country abounds in pine trees. This fine road, which is 135 miles from any railroad, is as well built all the way to the City of Guatemala.



A grist mill between Antigua and Patzún. It is run by water power. This well-built road runs for 95 miles north and through the mountains from Guatemala City and is used by automobiles.



A market scene in the City of Guatemala



On the road to Antigua. In the center foreground is an Indian carrying a plate glass case



The ornate structure in the left foreground is the automobile showroom of W. E. Jessup, Studebaker agent in the City of Guatemala

but, strange as it may appear, there are no trucks.

Guatemala City is a modern Latin-American city with a fine class of shops, good hotels, and paved streets. Eight years ago a determined effort was made to complete the paving of the city, parts of which still had dirt streets. To-day every street in the city is paved, most of the pavements being comprised of smooth, flat granite stones, averaging from 12 to 20 in. on a side and evenly placed together. There are about 75 miles of good paved streets in Guatemala City and its environs, including some attractive parked boulevards.

#### Country Is Rich

Despite the present inactivity of the coffee market, owing to the war, a considerable part of the Guatemala coffee crop formerly having been marketed in Hamburg, there is a great deal of wealth in this and other leading cities of the republic. It is reflected in the costly articles of jewelry, fine wines, silks, umbrellas, embroideries, shoes, hats, ball dresses and Parisian garments displayed in the shops.

It is among the plantation owners, who divide their time between their estates and their city residences in Guatemala City, and among the well-to-do merchants of Guatemala City, that the most active purchasers of automobiles will be found. There are only fifteen automobiles in Quetzaltenango, the second city in the republic, with a population of 40,000. Yet this city has magnificent public edifices, fine buildings and stores. Here, as in Guatemala City, pianos, pianolas, talking machines, cut glass and plate glass, hand-carved furniture, perfumes and jewelry, silks and other luxuries find a ready sale.

The opportunities for the sale of automobiles in Guatemala City become evident by a comparison with the automobile market in other Latin-American cities in the Caribbean region. Compare Guatemala City, centering the wealth and population of the growing republic, with the City of Panama, for example. The latter, with a population of 70,000, has neither the wealth, the population, nor the roads of Guatemala City, but it has more than 1000 automobiles. Americans have introduced the fashion in Panama and vigorous salesmanship has done the rest. San José, the capital of Costa Rica, with a population of 35,000, has about 150 automobiles. Like Guatemala City, it is the center of a rich coffee

district, and it is also located in high tablelands where automobiles can be used. There are at least 6000 automobiles in the city of Havana. Forty-five new machines, mostly high-priced cars, have been sold in Barranquilla, Colombia, during the past year. Barranquilla has a population of 40,000, and its streets are mostly unpaved. In Panama City I have seen natives whose shabby clothes indicated they were in poor circumstances, but who owned good cars. I recall the case of a colored man in Panama, a native Panamanian, who bought a high-priced six-cylinder car. To him this represented about the most desirable article that could be purchased. He became the envy of his neighbors.

You cannot always judge a prospect in Latin America by his clothes, though, as a rule, the people dress well. Automobiles, like most other goods in Central America, are sold on time. It is the custom of the country. Long-

time credits are usual in merchandising when business is done with a firm of long standing and good credit at the banks. Often all payments are made through the banks. When a salesman is not sure of his party, however, he, of course, demands cash. In this way some sales are lost. A Guatemalan of apparently limited circumstances may be worth \$20,000 or \$30,000 gold. He may have reached the point where he is willing to put down a couple of hundred dollars on a horse race without worrying whether he is going to win or lose, yet he has not quite reached the point where he feels able to raise his scale of living. It takes an agent who knows the people to make that kind of sales. But unless one has a thoroughly competent salesman or agent on the ground the only practicable method would be to sell through the banks, or for cash. A manufacturer will sometimes secure an introduction to a capable agent through the banks.

#### Medium-Priced Car in Demand

Of the cars at present in Guatemala, the medium-priced American machines are most used. I have never heard of a foreign machine there, and do not believe there are any. The five-passenger type is in most demand. For stage work, however, over the country roads, the heavy seven-passenger touring cars are used. They permit the traveler to carry his heavy luggage with him. Although for private sales the medium-priced cars are most in demand, yet the highest-priced, most fashionable, and most showy car that is made would probably sell quicker to the wealthy than a cheaper car. There are no sight-seeing cars in Guatemala City and no automobile stages between the city and its suburbs. In some Latin-American cities the automobile stage has been introduced with success, as in Cartagena, Colombia and Barranquilla, Colombia. I believe it could be introduced with profit in Guatemala City. The International Railways runs seven trains a day to Ciudad Viejo, 3 miles distant, and they are crowded. Automobile stages, however, are used in several country districts. There is one running between San Felipe and Quetzaltenango, a run of 35 miles, in the northern part of the republic. San Felipe, on the railway, has an altitude of 2000 ft. Quetzaltenango, which has no rail connection, has an altitude of 7800 ft., so that the climb is a steep one. From Quetzaltenango the road, newly graded, goes 18 miles farther to Totonic-



pan, 8300 ft. above sea level. This mountain road has, therefore, a total length of 53 miles. Business men en route to Quetzaltenango patronize the automobile, as the journey by mule stage takes 12 hr.

Correspondence can be carried on in English with those at present engaged in selling automobiles, with bank officials, or the heads of other quasi-public enterprises. But Spanish is preferable. While the employer may understand English, his employees, as a general rule, do not. Very few employees or mechanics in the garages understand English. Some have an imperfect knowledge that might suffice in conversation, but not for reading.

Advertisements, instructions, or specifications in English will not be understood by one-tenth of the customers or chauffeurs. Spanish will command greater attention, for it is the language of the country.

#### Only One Automobile Showroom in Republic

The first to be established, and practically the only automobile showroom in Central America, is that conducted by W. E. Jessup at 7a Avenida Sur and 10a Calle Oriente, Guatemala City. It is in the heart of the city. There are also three principal garages—the Emerson Garage, the Garage Brolo, and the Garage Denvy. These cater to the existing business, the care and repair of automobiles. The average car owner of moderate means in Central America is more than likely to be his own mechanic. This is particularly true if he lives in the provinces, where it may be difficult to obtain help. The average native seems to take naturally to the automobile or gasoline launch. I have never yet been delayed by the failure of a gasoline boat, of which there are many, to continue on its journey, nor by an automobile. A demonstrator usually has easy work.

The development of the automobile in Guatemala will be in the highlands. In the normal growth of the republic many thousands of automobiles will be sold there within the next 10 years. Whether the sales will be beyond normal depends on the salesmanship employed. No class of men is fonder of the good things of life than the wealthy or well-to-do Latin Americans. But there has been no active selling propaganda or personal work to interest prospective buyers.

In the transportation of tourists the automobile is destined to play a big part in Guatemala. Much of the mountain country can be reached by automobile. The scenery in these regions is beautiful in the extreme, sometimes almost appalling in its magnificence. While the tourist will not be able to visit all the mountain lakes, or to reach the bases of all the volcanoes by automobile, there are a number that can be so visited, and the landscapes viewed will surpass any expectation of their beauty the visitor may cherish.

A good road of 30 miles takes one from Guatemala City to Antigua, the former capital of the republic. Here are to be found the most extensive ruins outside of Egypt. Antigua, which had a population of 250,000, was destroyed by an earthquake on July 29, 1773. It ranked with Lima, Peru, as one of the two finest cities on the western hemisphere. The ruins of fifty-eight great churches and monasteries, some of them covering 6 and 8 acres, are to be seen, and despite their partial destruction

they reveal their former architectural magnificence. There are good hotels in the town, which has been restored, and near by rises the symmetrical volcano, Mount Agua (water), rivaling Fujiyama of Japan in beauty, and known as the most unruly of Central American volcanoes.

A charming automobile journey from Guatemala City is that to Lake Amatitlan, the nearest point of which is about 17 miles west of the city. The lake has an elevation of about 4000 ft. above sea level, and suggests the lakes to be found in the Adirondacks. But the environment has far more of grandeur. The great volcanic peaks near by rise high into the heavens, their summits usually shrouded in masses of white clouds. I passed along the north border of the lake, and found the road a good one. Lake Atitlan, about 50 miles north, is even more beautiful. It lies 5000 ft. above sea level, and is 27 miles long and 12 wide at its widest part. Its waters are cool and crystal clear, with its greatest depth 1000 ft. From its south approach the lake is seen from an elevation of 2300 ft., a superb panorama being obtained from the pine-covered tablelands. From the opposite shore of Atitlan rise five volcanic cones, the loftiest being more than 12,000 ft. high.

A picturesque automobile stage ride is that between San Felipe and Quetzaltenango, already mentioned. The road skirts the base of Santa Maria, the only active volcano in Guatemala. The picture taken by the writer at Santa Maria, on this road, shows the automobile stage stopping to permit the passengers to go to lunch. Mount Santa Maria, in this vicinity, is a picturesque cone 12,000 ft. high, and as symmetrical as the famous Mount Fujiyama in Japan. Near the crater the ashes are 200 ft. deep.

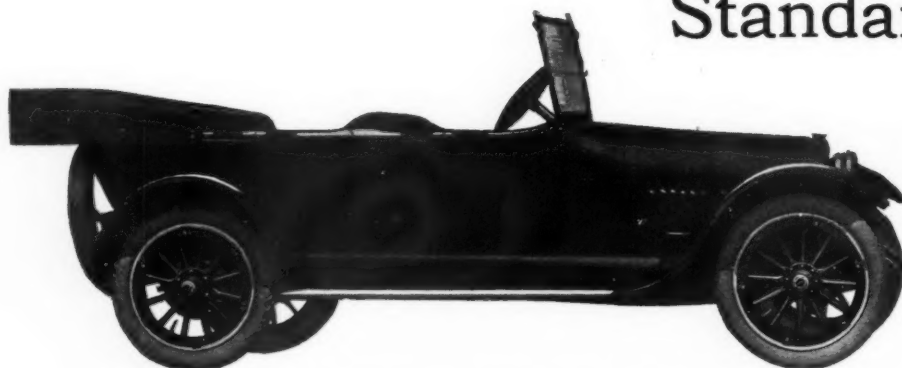
For those who like to explore or to visit out-of-the-way places, there could be no region of more fascinating interest than this section, which is becoming better known to American tourists. In addition to its mighty volcanoes and superb lakes, it abounds in relics of the ancient Mayas, who had attained the highest native civilization to be found in all the Americas, not even excepting that of the races over which the Incas presided. They had developed the art of sculpture to such a point that their statues, though crude, represent the ancient popu-

(Continued on page 74)



Here is another street scene in the City of Guatemala. The passenger car and automobile truck are conspicuous by their absence

## 1918 Buick Sixes Have Standardized Engine



1918 Buick seven-passenger touring car, showing double cowl effect and slanting windshield. Note long running board and smooth body lines. It sells for \$1,495

Large Size Adopted for 1918 —  
Some Detailed Improvements  
in Four—500-Lb. Delivery  
Car an Added Feature

**B**Y the adoption of its larger six-cylinder engine for both the five-passenger and seven-passenger sixes, the Buick Motor Co. has improved its cars for 1918 from a manufacturing and production standpoint as well as from the standpoint of the user. The production end of the Buick schedule is improved because, instead of making three engines for the complete line of cars, it is now only necessary to make two, one six and one four. The line has also been improved from the standpoint of completeness by the addition of a 500-lb. delivery wagon mounted on the chassis of the four-cylinder car.

In addition to this solidifying of the line a number of detailed improvements have been incorporated in the chassis.

The engine formerly known as the Buick Little Six, having a bore of  $3\frac{1}{4}$  in. and a stroke of  $4\frac{1}{2}$  in., has been discontinued and in its place the standard six-cylinder engine is used. The four-cylinder engine remains the same as it was in its general characteristics. It has also had some detailed improvements, as will be explained.

### Three Chassis Models

The Buick chassis line for 1918 is composed of three standard models. Two of these are sixes, and the only material difference between them is the wheelbase, which is 124 in. in the larger and 118 in. in the smaller, the engines and other members being the same. On the four-cylinder chassis the smaller bodies are mounted and also the light delivery wagon. This four-cylinder chassis, while in most respects the same as used last year under the model number of D-4, has also been materially improved.

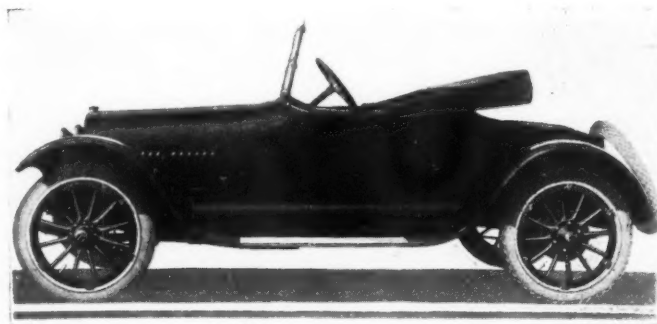
The larger six, which was described in *THE AUTOMOBILE* for Jan. 4, and which was introduced at that time, has been left unaltered as far as the chassis is concerned. A few changes have been made of a minor nature in the body and color scheme, but as far as the engineering features of the chassis are concerned they remain unaltered. It is the engine which was brought out particularly for this seven-passenger car which has now been adopted as the standard six-cylinder Buick engine and used in both the six-cylinder chassis.

### Wheelbase Made 3 In. Longer

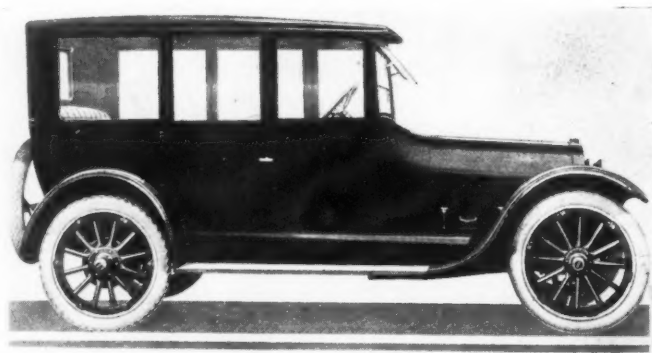
The other six, which was formerly known as the Buick Little Six, has been made larger and improved in many details. The primary improvement is of course the adoption of the larger engine, but in addition some of the details bearing important relations to the size and comfort of the car have been altered. The wheelbase has been lengthened 3 in., making 118 in. instead of 115 in. The clutch is a dry plate multiple disk instead of the leather cone. A new type of universal joint of Buick manufacture has been used in place of the type employed in the 1917 cars. The new universal is an inclosed type with spherical ball drive. Some of the other

changes which will be noted on the new models which are just entering into production are the following:

Grip type of brake lever in place of the button top type, ball-bearing distributor in place of plain bearing distributor on the Delco generator; raised radiator and hood giving a long straight line effect to the entire car; Timken roller bearings in the front wheels instead of ball bearings; deeper frame section to accommodate longer wheelbase; roomier bodies on account of the longer wheelbase, as the 3 in. addition has been made up in the tonneau length, and besides the new body is  $3\frac{1}{2}$  in. wider; pleated, buttonless upholstery in the cushions; sloping windshield, Pantasote top in place of mohair; hand pads on the doors; flush edged body panels; new type demountable rims, and the new Stewart quick-resetting speedometer. In order to improve the service work on the car, a hole has been added in the side apron to facili-



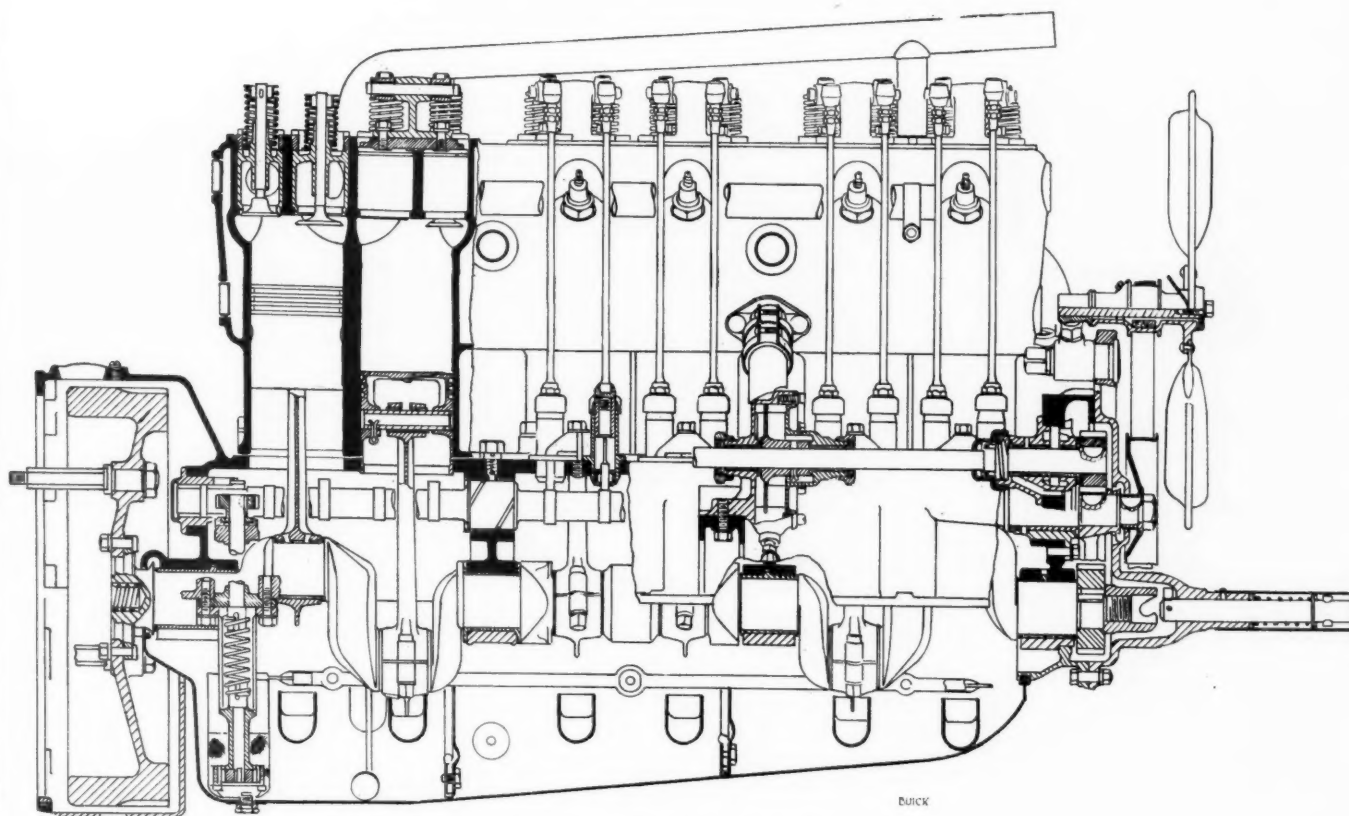
Six-cylinder three-passenger roadster for 1918, showing rear deck compartment and sweeping fender lines. Price \$1,265



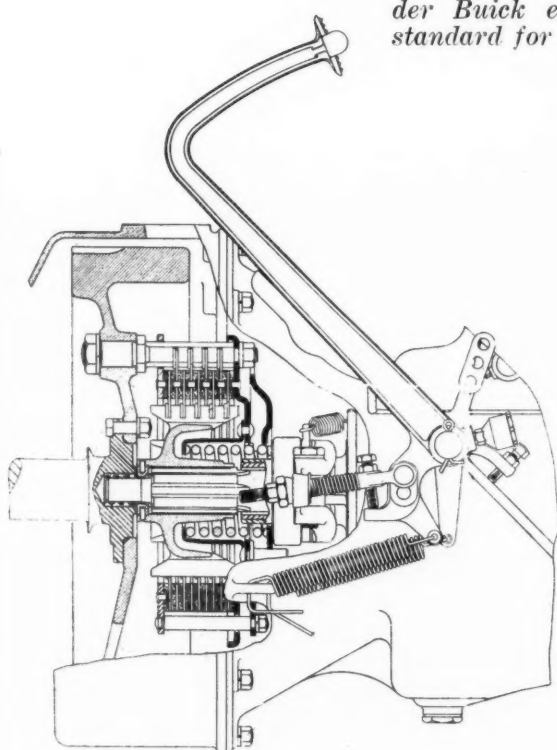
Seven-passenger sedan mounted on the 124-in. six-cylinder chassis and listed at \$2,175



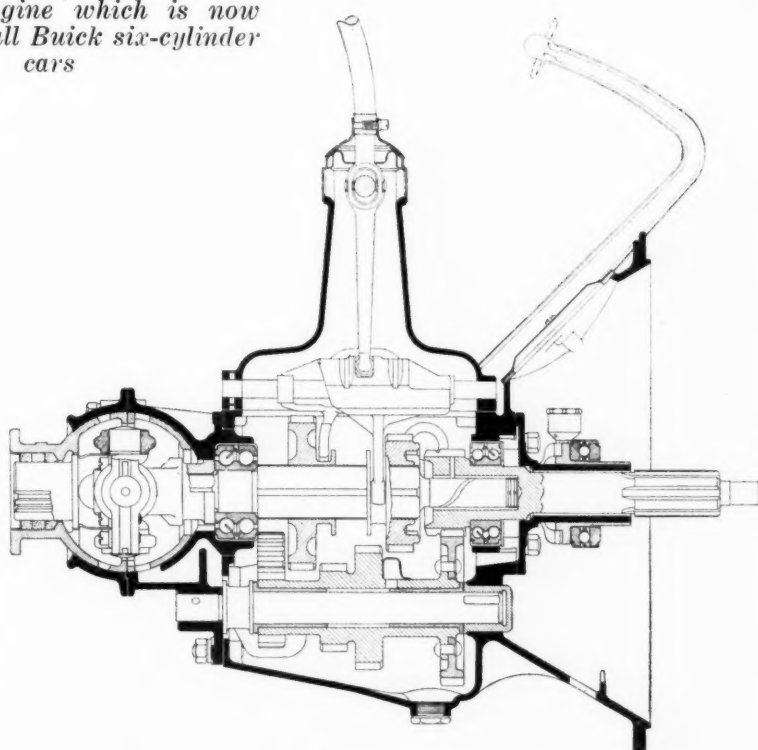
# POWER PLANT DETAILS OF 1918 BUICK LINE



*Sectional view through six-cylinder Buick engine which is now standard for all Buick six-cylinder cars*



*Improved Buick clutch now used on the six-cylinder models*



*Section of the transmission gearset which has been refined for the 1918 Buick models*

tate removal of the spring bolts, and a hole has been added in the drip apron to facilitate draining of the crankcase.

#### Improvements on Four-Cylinder

On the four-cylinder model there are a number of detail improvements. The gear type oil circulating pump has been adopted to replace the plunger pump used last year. This new pump is driven by a horizontal shaft off the camshaft. An oil sight feed has been installed on the instrument board. An ammeter or charge and discharge indicator is also mounted on the instrument board. An improved accelerator pedal of the rocking type has replaced the plunger type previously used. New valve lifts with dust guards to prevent rapid wear are employed on the engine. A new type universal joint is employed, of which the parts are high grade alloy steel without separate bushings, giving a joint in which the steel pins bear directly against the steel bushings. The control lever has been lengthened, making the car more convenient from the driver's standpoint. The rear springs have been lengthened 4 in. For improved appearance and riding qualities the following changes have been made:

The instrument board has been narrowed; trim rails added all around the body; seats low and with higher backs; plaited type of cushions and backs in the seats; linoleum floor board covers instead of rubber; fenders crowned; windshield made sloping; mohair top in place of the former fabric; improved curtains with larger lights; new type of demountable rims and better general finish.

#### Body Lines Are Broader

The body line employed on the 1918 Buick models has been broadened out and made more complete in every respect. On the largest chassis with the 124 in. wheelbase there is a seven-passenger touring car with double cowl and disappearing extra seats, and a seven-passenger sedan, a product of the Fisher Body Co., giving the touring combination with permanent top and disappearing glass side panels. The seven-passenger touring car sells for \$1,495, and the sedan for \$2,175. On the smaller six-cylinder chassis there are four bodies, a three-passenger roadster at \$1,265, a five-passenger touring at \$1,265, a five-passenger touring coupé at \$1,695, and a five-passenger Springfield type touring sedan at \$1,795. On the four-cylinder chassis there are two passenger bodies and a light delivery wagon. Both the passenger bodies sell for \$795, one being a two-passenger roadster and the other a five-passenger touring. The light delivery wagons sell for \$790.

#### Engine Follows Buick Practice

Buick practice in all its characteristics has been followed closely in the six-cylinder engine. Probably the most familiar part of this is the overhead valve action, in which the valves are inclosed in detachable cages. The larger six-cylinder engine is characterized by the fact that the inlet valves are larger than the exhaust, and because of this fact it has been found necessary to slightly stagger them on the cylinder head. The bore of the engine is 3 3/8 in. and the stroke, 4 1/2 in. It has its cylinder cast in a block, with integral heads. Neither the cylinders nor pistons are offset. The pistons have three 3/16 in. rings. The connecting-rods are I-beam section, 8 59/64 in. long, with a piston pin bearing 3/4 by 1 1/2 in., and the crankpin bearing 1 15/16 in. by 1 1/8 in. The crankshaft has four main bearings, of which the front and both center bearing dimensions are 1 15/16 in. by 2 1/8 in. The rear crankshaft bearing has the same diameter but a length of 3 3/32 in. The camshaft is carried on four main bearings, and the valve drive is through external push rods to the overhead rockers. The valve dimensions are 1 3/8 in. across the throat for the inlet and 1 1/4 in. across the throat for the exhaust. The valve list is 9/32 in.

Lubrication is accomplished by a constant level circulating splash system, operated by a gear pump driven by spiral gears from the camshaft and completely inclosed in the lower part of the crankcase. There are a wheel type of sight feed on the instrument board and an oil level gage on the crankcase. The oil is delivered direct to the main bearings and to other points by the splash system.

Cooling is by means of a centrifugal circulating pump driven by spiral gears in conjunction with a cellular type radiator and a pressed steel radiator fan driven by an adjustable belt from the camshaft.

The carbureter is an automatic float-feed type, supplied by vacuum system from the gasoline tank mounted on the rear end of the frame. There is a carbureter air regulator on the instrument board.

#### Delco Electric System

Ignition, lighting and starting are accomplished by a complete Delco single unit system, built as an integral part of the engine in conjunction with a three-cell, 80-amp.-hr. Exide battery. The Delco system operates at 6 volts, and is connected by the single wire method. The reduction between the starting motor and the engine is 21.5 to 1.

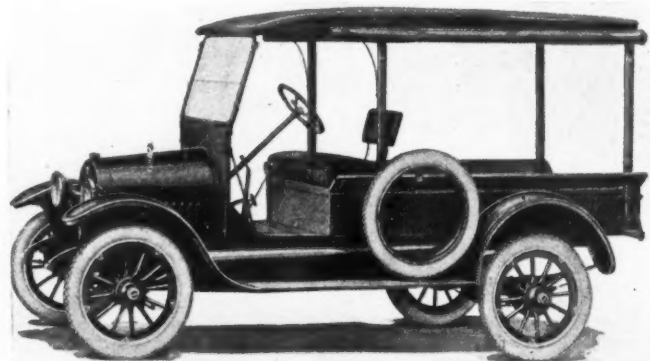
From the engine the power is transmitted through a disk clutch to a three-speed selective sliding gearset, in which the reductions are 3.36, 1.76 and 1 to 1 on first, second and third gears, and 4.32 to 1 on reverse. The gears are 7-9 pitch with 3/8 in. faces.

On the 124 in. chassis the tire size is 34 by 4 1/2 in., while on the 118 in. it is 34 by 4 in. The depth of the channel frame on both these models is 6 3/8 in. and each has a 3 1/2 in. drop. The front springs are 36 in. long by 2 in. wide, with nine leaves on the 118-in. wheelbase car, and thirteen leaves on the 124-in. wheelbase car. The rear springs are 46-in. cantilevers, 2 1/2 in. wide, having from eight to eleven leaves in accordance with the body mounted upon the chassis. The rear axle is a floating type having 4 to 1 ratio on the 118 in. car and a 4.615 to 1 ratio on the 124 in. car. The driveshaft is 1 3/8 in. on the lighter car and 1 1/2 in. on the heavier type. The differential bearings are Timkens with ball thrust. The road clearance is 10 1/2 in., and the 124 in. cars are equipped with rebound snubbers on the front end.

Beyond the changes mentioned, the four-cylinder models remain the same as they were for 1917. The cars have the 3 3/8 in. by 4 1/4 in. overhead valve block engine with the cylinder head case separately. They are pump cooled, splash lubricated, with Delco lighting, starting and ignition delivering the drive through a leather faced cone clutch, three-speed gearbox, and three-quarter floating axle. Tires are 31 by 4 in.

#### Delivery Car on Four-Cylinder Chassis

It is on this four-cylinder chassis that the light delivery car is mounted. The standard 106-in. wheelbase applies for this as well as for the passenger cars. This light delivery car is put out in the form of an open flareboard body with a canopy top and side curtains. The inside of the body measures 42 1/2 in. by 70 in., including the space under the rear of the driver's seat. It is equipped with Delco lighting, starting and ignition, the same as the other cars and is suitable for quick delivery service. It is mounted on 31 by 4 in. pneumatic tires, and is designed to fill the wants of merchants maintaining quick local delivery service. The car is put out with one standard form of body, but is of a type which would accommodate the closed type of body used by florists, etc., if desired.

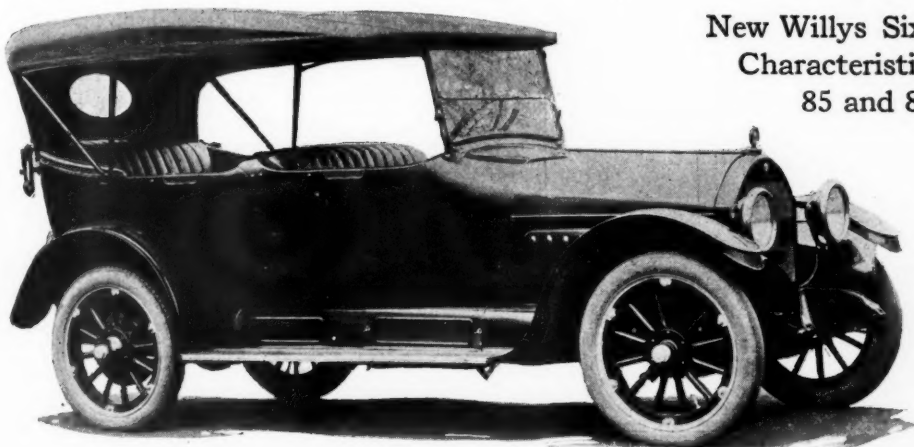


Buick 500-lb. delivery car mounted on the four-cylinder chassis, and selling for \$790



# Willys - Overland Combines Two Sixes

New Willys Six, Model 89, Embodies  
Characteristics of Previous Models  
85 and 88—Three Bodies



Model 89 Willys six touring car with center cowl effect and leather hand pads on doors. Note slanting windshield



Side view of the new Club roadster, Willys six, model 89



Dash and control layout

BY combining the characteristics of two of its models, the Willys-Overland Co., Toledo, has condensed its line to some extent. The two sixes, known as model 85 and model 88, both employing Continental motors, are the two models affected, and the resultant product is known as model 89. The power plant is the same as that used in the Willys six, known as model 88, and is the standard 45-hp.,  $3\frac{1}{2}$  by  $5\frac{1}{4}$ -in. Continental. The wheelbase of the new model is a compromise between the other two, which were 116 in. and 125 in., the wheelbase of the model 89 being 120 in.

## Willys Practice Followed

With the fact in mind that this new model is a combination of the elements contained in the two predecessors, everything which would be predicted from previous Willys practice has been followed: Cone clutch, gearset in unit with the rear axle, floating rear axle and torque tube method of taking the torsion stresses. The tires on the new model are 33 by  $4\frac{1}{2}$  in., which are larger than those employed on the smaller six last year, and smaller than those used on the larger six.

## Continental Engine Used

The standard form of Continental engine is employed, and needs no further description. Its six cylinders are cast in a block, with the valves on the right side, and the construction is the typical Continental L-head, which is well known. The Tillotson carbureter is fitted, and

this is fed by a vacuum tank. The carbureter size is  $1\frac{1}{4}$  in., and is of the side-outlet type, provided with full hot air for better evaporation in cold weather. Ignition is by a single-battery system, with a Connecticut distributor operating in conjunction with an 80-amp.-hr. storage battery, which may be either the Willard, U. S. L., or Prest-O-Lite make. The starting and lighting system is the Auto-Lite, both the generator and the starting motor being of this make. It is wired on the 6-volt, two-wire system, and the starting motor engages with the flywheel by means of a Bendix gear.

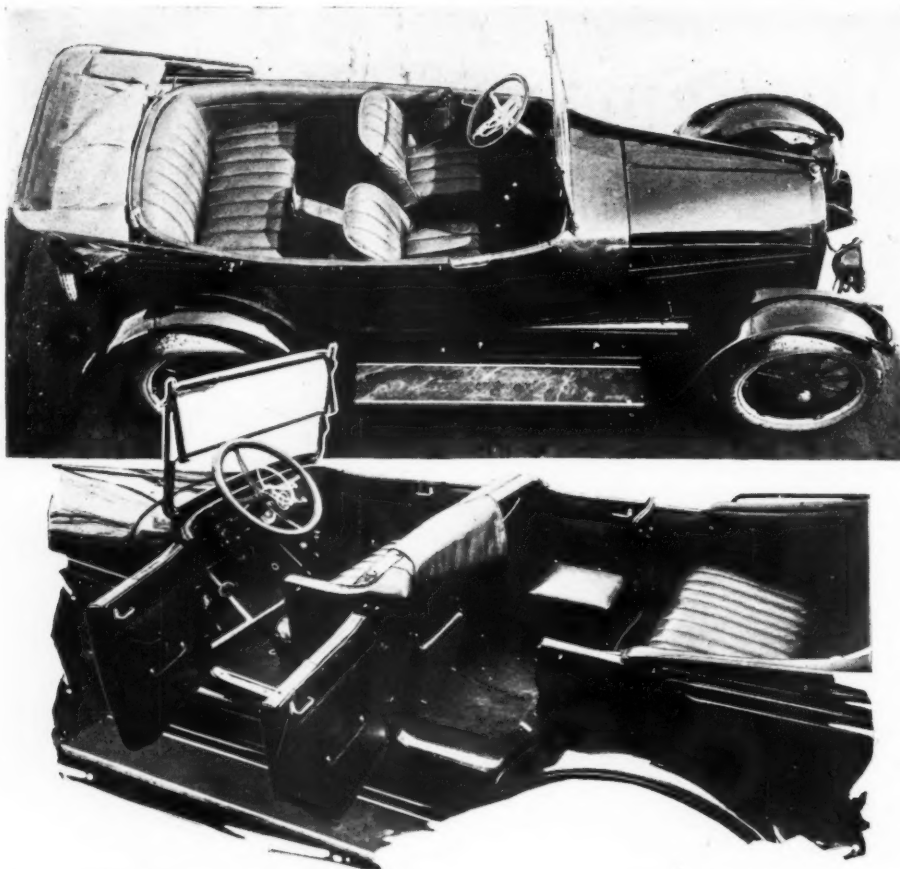
## Drive Is Spiral Bevel

From the engine the power is transmitted by means of an internal cone clutch through a selective sliding gearset in unit with the rear axle. The drive at the rear is a spiral bevel through a three-quarter floating rear axle, having a ratio of 4 to 1.

The car is provided with a Stewart-Warner speedometer, Standweld demountable rims, and Kellogg power tire pump.

## Three Body Types

Three bodies are provided on this car. They are a seven-passenger touring, a four-passenger cloverleaf at \$1,295, and a six-passenger sedan, the price of which is not yet announced. All these cars are on the same wheelbase of 120 in. The bodies have the same characteristics as previous Overland models, the touring car being a



Upper—The new Willys six, model 89, four-passenger Club roadster with adjustable front seats. This illustration also shows the boat-like body lines

Lower—Seating arrangement of the new Willys six touring car showing the double cowl effect and the disappearing extra seats

central cowl style, with leather pads on the doors. The upholstery is the long-grain Duratex. Two disappearing seats in the tonneau and the doors are provided with front hinges of the disappearing type. There are large pockets in all doors, and the tool compartment is under the front seat. The Club body is a four-passenger streamline type with a one-piece cowl. The front seats are separate, and are adjustable forward and backward. On this car the tool compartment is under the rear seat. On all the bodies the fenders are crowned heavy sheet steel.

#### Green Finish

The standard finish is olive green, with light green wheels. The upholstery is also in dark green, and the fittings are nickel and polished aluminum. The fenders and trimmings are black enamel. The control is similar to that used in the Overland models a year ago, in that the buttons are arranged on the side of the steering-column, and the instruments are grouped on the cowlboard to meet a projected instrument lamp.

#### Trucks Saved France

*W. F. Bradley will tell next week how motor vehicles won the battle of Verdun for our Allies.*

## Hyatt Merchandising Is Based On Co-operation

Dealer Helps Boost Bearing Sales

**S**YSTEMATIC advertising forms the basis of the merchandising plan of the Hyatt Roller Bearing Co., Detroit. The whole plan is co-operative, assisting the dealer and also acquainting users and prospective users with the features of the product. To get better teamwork in the ranks of its dealers the company sought to inspire good feeling among them by the distribution of material which the dealer would invariably welcome, such as Hyatt playing cards, calendars, etc.

The next step was to familiarize the dealer with what had been told his customers through the advertising columns of the business papers, newspapers, magazines, etc. All of this served to enliven the dealer's interest in the Hyatt bearings.

Later came advertising of a little more interest to him, that is, advertising that featured the Hyatt bearing more closely with his own car or cars. Next came a more intimate connection with the dealer's individual business, by advertising campaigns in the newspapers in which an attempt was made to focus the result of the business of the local dealer by first mentioning those cars in which Hyatts were used, and then referring the reader to each local dealer handling Hyatt-equipped cars.

#### Every Effort Capitalized

The co-operation feature of this plan is plainly seen. Another part of the merchandising plan which has brought results is the direct mail literature. The company has always made it an aim to capitalize each individual effort, to include it in its plan to bring results. For instance, by means of the

mail literature the company was able to serve the dealer by sending out thousands of booklets entitled *The Final Proof*, giving the results of a contest held for the purpose of discovering those cars which had traveled the greatest distance on their original Hyatt bearings. Another booklet, widely circulated, was that one listing each automobile using Hyatt roller bearings. This helped the dealer immeasurably.

#### Mailing Cards Used to Advantage

Mailing cards, advertising in combination Hyatt bearings with some one car in which Hyatt bearings were used, were profitably employed. Dealer and manufacturer both profited from their distribution.

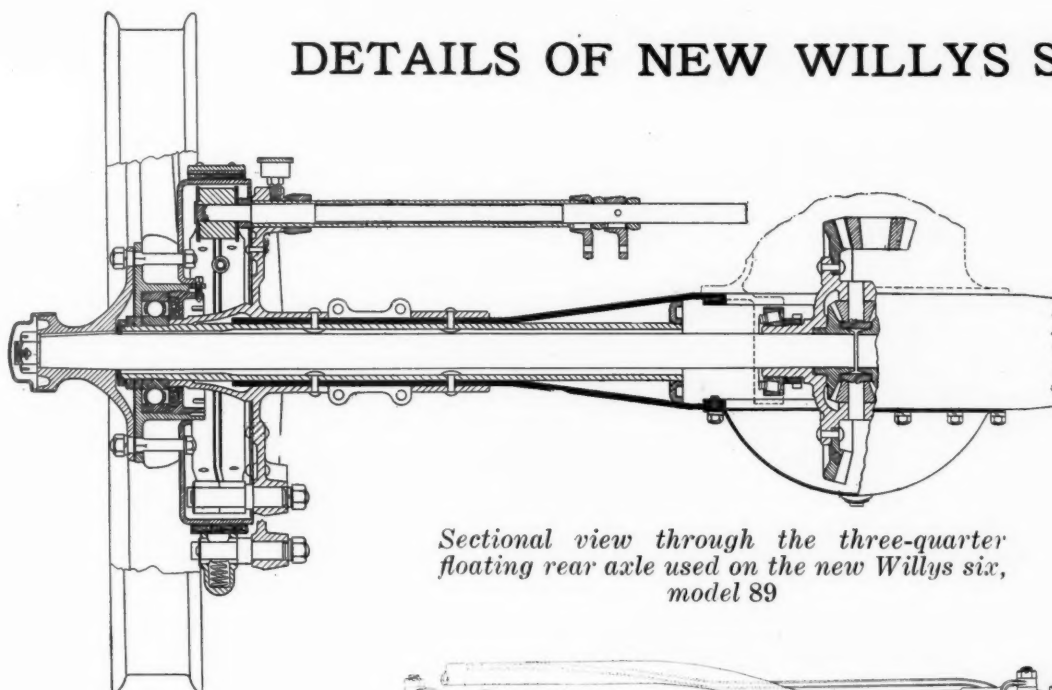
Next came the educational advertising in which those who cared to know something more about the principle and construction of the Hyatt bearings could be enlightened through a representative booklet, *About Bearings*, a treatise on bearings.

The features of the bearings were also outlined in a series of ten selling arguments known as *Hyatt Helps*. These were sent out in numerical order.

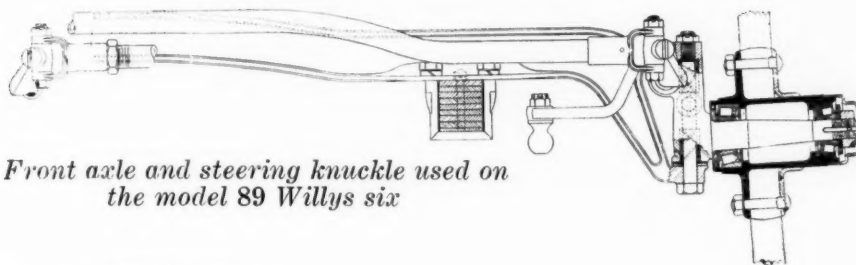
A part of the educational work among the dealers, which not only assisted each dealer, but also served to give a practical demonstration of Hyatt features and advantages to prospective automobile buyers, was sending a mailing card to which a Hyatt roller was attached. These, with other pieces of a similar nature, formed the framework of Hyatt educational efforts among dealers and their employees.



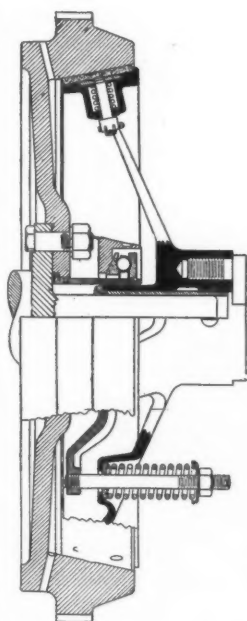
# DETAILS OF NEW WILLYS SIX



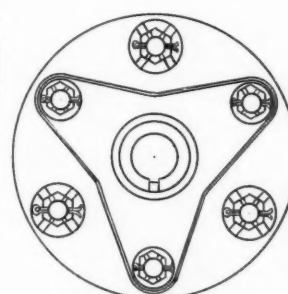
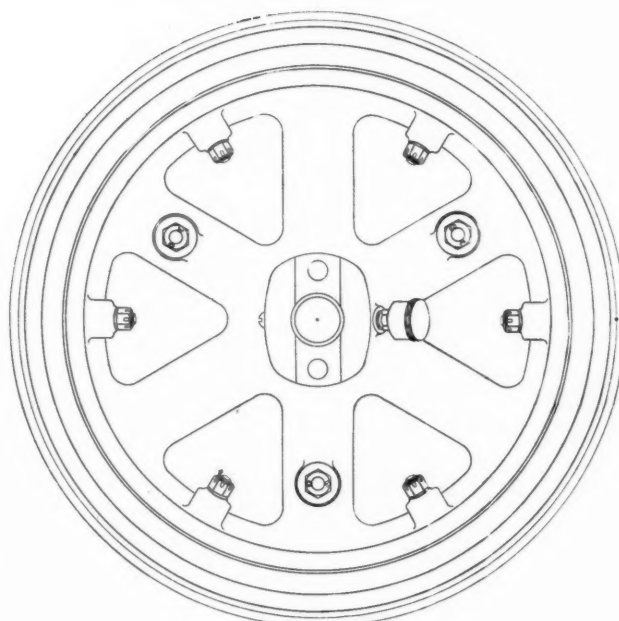
*Sectional view through the three-quarter floating rear axle used on the new Willys six, model 89*



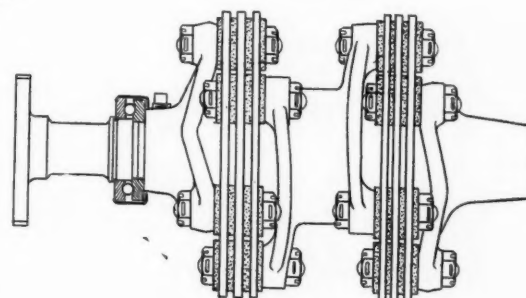
*Front axle and steering knuckle used on the model 89 Willys six*



*Above—Assembly view of the cone clutch, which is a feature of the new Willys six*



*Right—Leather universal employed on the front of the driving members of the model 89 Willys six, which combines previous models 85 and 88*



# Mulford Wins Omaha Valedictory

Hudson Captures 150-Mile Event in 1:28:53—  
Broken Axle Sends Chevrolet, Leading, to Pits  
—Lewis in Hoskins Wins 50-Mile Race

By W. K. Gibbs

OMAHA, NEB., July 5—Consistent driving on a track that disintegrated more and more with every circuit won for Ralph Mulford in his Hudson Super-Six the 150-mile valedictory race on the 1¼-mile Omaha speedway yesterday. Mulford maintained an average pace of 101.4 m.p.h., nosing out Tommy Milton's non-stop Duesenberg by seconds. Louis Chevrolet led the field until the fifty-seventh round, when his Frontenac sustained a broken axle. He set a stiff pace while in the field, doing well up around 110 m.p.h.; and in the second race of the afternoon, the 50 mile event, he set a record pace for this speedway by driving several laps at 111 m.p.h. until again he had to go to the pits. Dave Lewis in a Hoskins won the 50-mile race in 29:03, an average of 102.85 m.p.h.

Mulford came into the pits twice for tires at a time when it looked as if his ill-luck of last year when he fought a stiff battle with Resta was about to be repeated, but his total time at the pits was only 55 sec. Only 2 min. and 43 sec. separated the first six to cross the tape.

Mulford was the only one who did not suffer a change from the flag finish when the timing tape was checked last night. Immediately after the last car was off the course, Manager Martin of the Mercer team declared that Thomas' Mercer finished first and Haines' Mercer second and that in his opinion Milton's Duesenberg beat Mulford. However, Mulford was first to get the flag and the others were flagged in this order: Second, Thomas, Mercer; Haines, Mercer; Milton, Duesenberg; Hearne, Duesenberg; Lewis, Hoskins; Burt, Miller Special; Taylor, Hudson. A check of the timing tape placed the cars and drivers as follows: Mulford, Hudson, first; Milton, Duesenberg, second; Thomas, Mercer, third; Hearne, Duesenberg, fourth; Taylor, Hudson, fifth; Haines, Mercer, sixth; Lewis, Hoskins, seventh and Burt, Miller Special, eighth.

## Scoring Inefficient

Vitriolic charges were made against the timer and the writer that ranged from the payment of money to throw the race to that of being on the payroll of the Hudson company. This came about, very likely, through an expressed desire on the part of those checking the times to be undisturbed until the check was finished. There was no trouble with the timing, but the scoring was bad. Had the scorers been efficient there would have been no misunderstanding in flagging the cars. The manager of the Mercer team to-day declared he would protest on the ground that Mulford had six men working on his car at one time. Photographic evidence showed two of the six men seen about Mulford's car at the time of his second tire change to be a member of the technical committee and the A. A. A. representative. This afternoon all drivers accepted checks for their prize winnings and the talk of protest ceased.

## Course in Bad Condition

That only five cars were docked during the race and one wrecked indicates that Fate sometimes is kind to race drivers. The track is to be dismantled shortly. A couple more race days like yesterday would come near to an automatic dismantling of

the course. Built of inferior materials, the Omaha track showed signs of disintegration last year—it was then only a year old—and although the numerous ruts that were present a year ago had been filled with cerænt and asphalt, the elements had worked havoc with numerous other places in the course and holes developed early in yesterday's main event. Many of the drivers were bruised by flying pieces of two-by-fours and to-day are picking slivers of wood from their hands and bodies.

When the 150-mile race was about two-thirds over a hole developed in the track just in front of the finish line. Starter Wagner stood out in the middle of the track with a yellow flag to warn drivers of their danger and later a yellow flag was set up to indicate the hole and is shown in some of the illustrations. An examination of the course after the main event showed the hole near the finish line to be of little consequence compared with those on the back stretch and in the turns. Louis Chevrolet told the writer that there were places in the back stretch where two-by-fours protruded from the track 2 ft. during the race and that it was the dropping of one of his wheels into a rut that broke his axle shaft and forced him to withdraw. The second race of the afternoon was delayed an hour and a half to allow a score of carpenters to rebuild parts of the course.

## Louis Chevrolet Leads at Start

Now for the race itself. Mulford drove the 150 miles in 1 hr. 28 min. and 53 sec., for an average speed of 101.4 m.p.h. However, it was Louis Chevrolet who showed the way until he went out in the fifty-seventh lap. He was closely followed by Kirkpatrick in the second Frontenac during the first part of the race. Chevrolet was doing laps at 111 m.p.h. and easily showed the best speed of any car on the course. The cars were sent away at 2 o'clock with Chevrolet at the pole and Kirkpatrick's Frontenac beside him. The others were lined up two abreast as follows: Lewis' Hoskins and Thomas' Mercer, second row; Hearne's Duesenberg and Mulford's Hudson, third row; Alley's Pan-American and Milton's Duesenberg, fourth row; Henderson's Duesenberg and Haines' Mercer, fifth row; Mason's Ogren and Taylor's Hudson, sixth row; Toft's Omar and Burt's Miller, seventh and McBride's Olsen special in the last row.

The cars got away to a false start and had to be flagged down and another trial made. This time the cars were fairly well bunched and Wagner gave them the flag. Chevrolet and

## Finish Times and Prizes in the Omaha Races

### 150-Mile Valedictory

| Car   | Driver  | Time       | M.P.H. | Purse    |
|---|---------|------------|--------|----------|
| Hudson                                      | Mulford | 1:28:53.00 | 101.40 | *\$3,550 |
| Duesenberg                                  | Milton  | 1:29:57.07 | 100.05 | \$1,700  |
| Mercer                                      | Thomas  | 1:30:18.20 | 99.66  | 1,000    |
| Duesenberg                                  | Hearne  | 1:31:21.28 | 98.52  | 800      |
| Hudson                                      | Taylor  | 1:31:27.69 | 98.41  | 700      |
| Mercer                                      | Haines  | 1:31:36.28 | 98.25  | 500      |
| Hoskins                                     | Lewis   | 1:34:35.69 | 95.16  | 300      |
| Miller                                      | Burt    | 1:37:44.60 | 92.40  | .....    |
| * \$350 for finishing first with A-C plugs. |         |            |        |          |
| † \$100 for finishing with A-C plugs.       |         |            |        |          |

### 50-Mile Event

| Car        | Driver    | Time     | M.P.H. | Purse   |
|------------|-----------|----------|--------|---------|
| Hoskins    | Lewis     | 29:03.00 | 102.85 | \$1,000 |
| Hudson     | Mulford   | 30:12.45 | 99.31  | 500     |
| Duesenberg | Milton    | 30:14.10 | 99.22  | 300     |
| Duesenberg | Henderson | 30:14.50 | 99.20  | 200     |
| Hudson     | Taylor    | 30:14.85 | 99.18  | ....    |

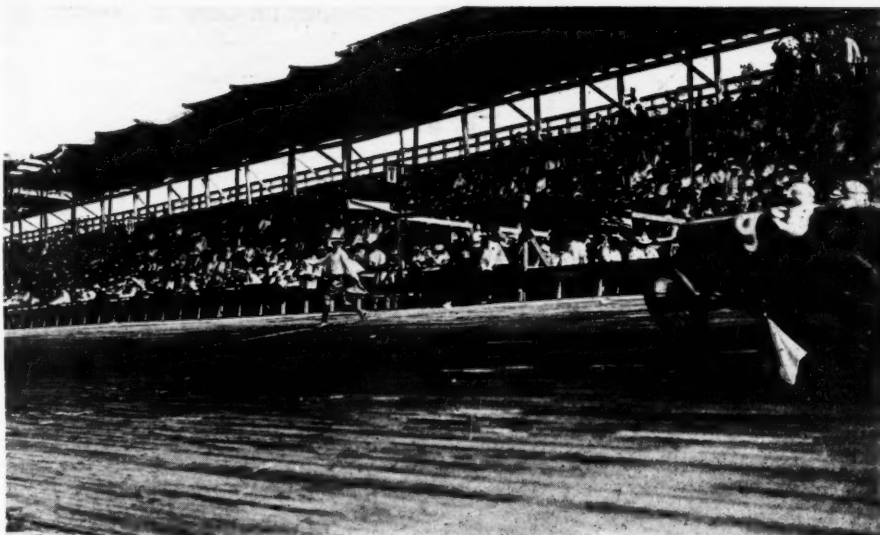


Kirkpatrick thundered across the tape in the lead and simultaneously Alley's Pan-American was seen to dart swiftly from its position on the inside of the track on the turn into the homestretch, go about two-thirds of the way to the outer rail, then veer sharply back across the track, strike the dirt at the edge of the apron and turn two complete somersaults, Alley and his mechanic, Billy Salmon being hurled through the air and out of the way of the machine on the first of its double flipflop.

Lap after lap Chevrolet shot his Frontenac across the line, doing well up around 110 m.p.h., while Kirkpatrick was close on his heels in the second Frontenac. They held first and second place in the tenth, twentieth, thirtieth and fortieth laps and Chevrolet led at fifty laps, going out in the fifty-seventh with a broken axle shaft when he was leading the field. Joe Thomas' Mercer was playing for third place early in the race and eventually finished there, although Mulford's Hudson and Milton's Duesenberg passed him and took first and second places after Chevrolet and Kirkpatrick relinquished their hold on these coveted positions. Dave Lewis had his Hoskins going in fine shape and looked like a real contender until several tire changes dropped him down to seventh place at the finish.

Mulford passed Thomas on the twenty-seventh lap, going into third place, while Eddie Hearne pushed his Duesenberg into fifth position. Neither Milton, Thomas, nor Billy Taylor, who finished fifth, made a stop during the race. Dave Lewis was the first to stop at the pits. Hearne visited the pits in the thirty-seventh lap, but was away again in 20 sec., while Mason's Ogren and Toft's Omar were docked at the same time, the former with a broken radiator and the latter a broken crankshaft. Spectators thought the Omar was to repeat the performance of the Burman Special driven by Jack Gable last year. It was seen to leave the track at the turn-out of the home stretch, but stayed right side up and later was found to have been purposely driven off the course when Toft found his engine disabled with a broken crankshaft.

Kirkpatrick's Frontenac cast the tread of a right rear tire when the race was practically half over. This occurred in front of the pits and meant a slow lap for him. Chevrolet relieved Kirkpatrick at the next time around and after changing plugs went into the race and drove like mad to



Ralph Mulford's Hudson getting the checkered flag. The flag immediately in front of the car marks a hole in the track in which the warning sign was placed when the 150-mile event was about half over. Drivers reported that there were many other ruts in the course equally bad

place the car in the money, but was out almost when he had a chance in the first four positions, with a broken waterjacket.

Mulford jumped into the lead as Chevrolet dropped out and checking of the timing tape showed that he never left that position. By consistent driving he gained slowly but steadily and when he was forced into the pits late in the race for a tire change that took 34 sec., he had a two lap lead and was not headed.

#### Lewis Wins the 50-Mile

In the second race of the afternoon Dave Lewis in his Hoskins showed the way to the field at the average pace of 102.85 m.p.h., doing the distance in 29 min. and 3 sec., just a shade slower than Ralph de Palma did last year in his Mercedes, when he drove the 50 miles at a little over 103 m.p.h., and for which he was given a world's record for 50 miles on a 1¼-mile track. At ten, twenty and thirty laps Lewis was averaging from 103 to 105 m.p.h., but in the last ten seemed to conserve his car and slowed up slightly, which brought his general average down.

The second race to-day was held from 4 o'clock until 5.30 so that the track might be repaired. This was the latest a race has been started in many months, according to Wagner. Bad luck again jinxed Chevrolet in the 50-mile race. He had taken an axle shaft from his team mate's car and put his own Frontenac in condition for the second race. He fought Lewis a hard battle for the first 15 miles and then came into the pits. Hopelessly outdistanced after the pit stop, he went back in and drove like a fiend, several of his laps being clocked at 111 m.p.h., which is fast for this size track and especially in the condition that it was left in after the first race. The pace he set never has been equaled on the Omaha track since it was built.

#### Only 10 in 50-Mile Event

Only ten started in the 50-mile event, the two Mercers staying out, even though finishing in the money in the big event. Thomas claimed his car was not in condition and Haines claimed clutch trouble. There may have been a little peevishness current on account of the results of the first race. Hearne, Burt and Mason dropped out of the 50-mile race shortly before the finish. Lewis did not stop but Mulford came to the pits once, and finished second with Tommy Milton and



Preparing for the get-away of the 150-mile valedictory race at the Omaha speedway on July 4. The track is to be dismantled in the near future

## Details of Equipment on Cars in 150-Mile Race at Omaha

| Car          | Driver      | Bore  | Stroke | Cast     | VALVES<br>No. | Loca-<br>tion | Igni-<br>tion | Plugs    | No.<br>Plugs | Car-<br>bureter | Tires    | Size     | W.B. | Lub.   |
|--------------|-------------|-------|--------|----------|---------------|---------------|---------------|----------|--------------|-----------------|----------|----------|------|--------|
| Frontenac    | Chevrolet   | 3.780 | 6.375  | Block    | 16            | Head          | Bosch         | K.L.G.   | 4            | Miller          | Goodyear | 33x5     | 104  | Oilzum |
| Frontenac    | Kirkpatrick | 3.780 | 6.375  | Block    | 16            | Head          | Bosch         | Rajah*   | 8            | Miller          | Goodyear | 32x4 1/2 | 104  | Oilzum |
| Mercer       | Thomas      | 3.875 | 6.375  | Separate | 16            | Head          | Bosch         | Rajah    | 8            | Miller          | Goodyear | 33x5     | 108  | Oilzum |
| Mercer       | Haines      | 3.875 | 6.375  | Separate | 16            | Head          | Bosch         | Rajah    | 8            | Miller          | Goodyear | 33x5     | 108  | Oilzum |
| Hoskins      | Lewis       | 3.750 | 6.750  | Block    | 16            | Head          | Bosch         | Rajah    | 8            | Miller          | Goodyear | 33x5     | 105  | Oilzum |
| Duesenberg   | Hearne      | 3.750 | 6.750  | Block    | 16            | Head          | Bosch         | Rajah    | 8            | Miller          | Goodyear | 34x4 1/2 | 106  | Oilzum |
| Duesenberg   | Milton      | 3.750 | 6.750  | Block    | 16            | Side          | Bosch         | A.C.     | 8            | Miller          | Goodyear | 34x4 1/2 | 106  | Oilzum |
| Duesenberg   | Henderson   | 3.750 | 6.750  | Block    | 16            | Side          | Bosch         | A.C.     | 8            | Miller          | Goodyear | 34x4 1/2 | 106  | Oilzum |
| Miller       | Burt        | 3.625 | 7.000  | Block    | 16            | Head          | Miller        | A.C.     | 8            | Miller          | Goodyear | 34x4 1/2 | 104  | Oilzum |
| Hudson       | Mulford     | 3.500 | 5.000  | Block    | 12            | Side          | Delco         | A.C.     | 6            | Hudson          | Goodyear | 33x5     | 107  | Oilzum |
| Hudson       | Taylor      | 3.500 | 5.000  | Block    | 12            | Side          | Delco         | A.C.     | 6            | Hudson          | Goodyear | 33x5     | 107  | Oilzum |
| Omar         | Toft        | 3.750 | 6.750  | Block    | 16            | Side          | Bosch         | Rajah    | 8            | Miller          | Goodyear | 34x4 1/2 | 106  | Oilzum |
| Pan-American | Alley       | 3.625 | 7.000  | Block    | 16            | Head          | Bosch         | Bosch    | 8            | Miller          | Goodyear | 34x4 1/2 | 106  | Oilzum |
| Olsen        | McBride     | 3.750 | 6.750  | Single   | 16            | Head          | Bosch         | Affinity | 8            | Miller          | Goodyear | 34x5     | 107  | Oilzum |
| Ogren        | Mason       | 3.625 | 7.000  | Block    | 16            | Head          | Rajah         | Rajah    | 8            | Miller          | Goodyear | 33x5     | 109  | Oilzum |

\*4 Special.—All cars used Boyce Moto-Meters and Hartford shock absorbers. Every car used Rudge-Whitworth wheels except Mason's Ogren, which used Houk.

Pete Henderson close behind. There were only four prizes in this event and although Taylor brought his Hudson across the line a close fifth he was outside the prize money. Only three-quarters of a second separated Milton, Henderson and Taylor at the finish of the 50-mile event.

Attendance to-day was approximately 20,000, being about equally divided between the grand stand and the infield. Only eleven casings were changed in the 150-mile race, which spoke well for cord tires when the heat of the day and the condition of the track were considered.

## 3000 Prospective Car Buyers in Guatemala

(Continued from page 65)

lation so faithfully that type after type may be traced among their successors and partial descendants, the modern Indians. The Mayas were able to transport stones weighing from 20 to 80 tons over great distances.

Guatemala City, with its wealth and opportunities for the use of the car, has far from reached its limit, and still clings to a large extent to the fashionable landau. The livery stables do a big business in renting out stylish hacks and carriages for use in the city alone, and import American horses for this purpose. There are a number of good roads and boulevards leading from the outskirts of the city, which are popular with motorists, horseback riders, and the wealthier Guatemalans in their liveried turnouts. When the high price of grain and other feed and the cost of the upkeep of horses are considered, it would seem that there is room for great expansion in the automobile line in Guatemala City alone. Gasoline sells from 65 to 75 cents a gallon, a lower price

than in San José, Costa Rica, a city with a greater number of automobiles.

I realize that American residents of Guatemala who may read this article may think my forecast of the opportunity for automobile salesmanship is overdrawn, but I do not feel that it is. The automobile is coming to stay in Latin America. Guatemala is an open field. The Guatemalans are liberal spenders. A banquet given by the Guatemala Coffee Planters' Association at the Panama-Pacific International Exposition, San Francisco, cost more than \$20,000.

Guatemala is under an absolutely stable government. Its administration is in the hands of President Estrado Cabrera, another Diaz, who has been re-elected to a term of office which will terminate in 1924. In contrast to Mexico, one may travel unarmed through any portion of the republic, for the country is strictly and efficiently policed and the people are naturally peaceable.

## Science Will Prevent Fuel Famine

UNDREAMED possibilities lie in scientific research for preventing fuel famine, and alleviating other supply shortages that the war and the increased population of the world may bring about. This encouraging message was recently brought before the Canadian Manufacturers' Assn. in an address by Arthur D. Little, research engineer of Montreal and Boston.

Gasoline may give out, but it is altogether possible that alcohol may be used as a substitute, being manufactured in sufficiently large quantities to bring down the price. Furthermore new methods of manufacturing the former fuel may be introduced, such as have been demonstrated in Alberta, Canada, where gasoline has been extracted from natural gas fields in commercial quantities.

There is nothing miraculous in these promises of the research engineer, for, as Mr. Little pointed out, each discovery is a development of previous knowledge. Or, as Pasteur has said, "in the field of observation chance only favors those who are prepared." The development of alcohol for commercial uses, for instance, is made possible by a discovery of nearly 100 years ago.

"In 1819," says Mr. Little's paper, "Braconnot boiled up some cellulose in the form of an old shirt with sulphuric acid and found that the cellulose was converted to a sort of sugar,

some of which he subsequently fermented into alcohol. He exhibited his results to the French Academy to the amazement of its members. A hundred years of industrial research has at last transformed that laboratory method into a commercially operative process, by which thousands of gallons of high grade ethyl alcohol are made from yellow pine sawdust. . . . The industrial importance of this achievement can hardly be overestimated. A cord of sawdust costing 50 cents yields 10 gal. of 95 per cent alcohol. By this process any vegetable waste which can be collected cheaply and in any quantity becomes a raw material for alcohol and releases for their proper use as a food the corn and molasses now diverted to alcohol production. Incidentally it removes substantially all menace of a possible failure of the gasoline supply, since alcohol is equally available as a motor fuel."

## Loose Tread Repairs

TREAD cut repairs are likely to loosen when the area to be repaired is not thoroughly roughened and the overflow of new stock is not removed. Take a piece of emery paper and sand off the repair until it is flush with the tread surface, with no loose edges remaining.—D. R. CAIN, Instructor, School of Tire Repairing, Goodyear Tire & Rubber Co.



# American Die & Tool Co. Gearsets

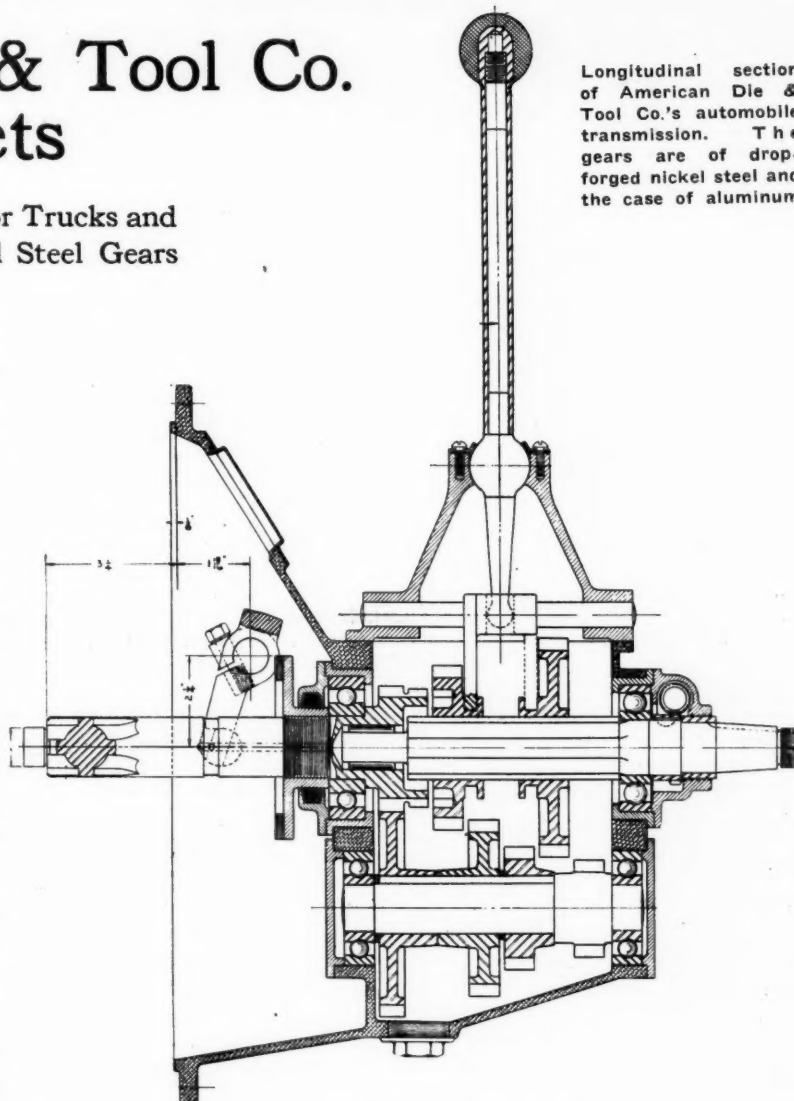
Special Design Made for Trucks and  
Passenger Cars—Nickel Steel Gears

**T**RANSMISSION gearsets for trucks and passenger cars are manufactured by the American Die & Tool Co. of Reading, Pa. The latest model of the company for motor trucks is designated as Model 5A and affords four forward speeds and one reverse. It is furnished either with an aluminum or a cast iron housing, at the option of the customer. All bearings are of the conical roller type, including the pilot bearing inside the constant mesh pinion. The primary shaft is of ten-spline construction, while the secondary shaft has the low speed and reverse pinions forged integral with it and the other pinions secured by means of Woodruff keys and fixed in position lengthwise by a collar and circular spacers. All gears are made from  $3\frac{1}{2}$  per cent nickel steel drop forgings and are cut with stub teeth of 6-8 pitch. With the exception of the constantly meshed set of gears, all gears have a face width of  $1\frac{1}{4}$  in. The gear ratios are as follows: First, 4.01:1; second, 2.61:1; third, 1.50:1; fourth 1:1; reverse, 4.85:1. The face width of the constantly meshed gears is 1 in. The center distance between primary and secondary shaft is  $4\frac{1}{2}$  in., which would indicate that the transmission is designed for use on 5-ton trucks. Some details of the shifting mechanism are illustrated in the drawing. The shaft ends are of the S. A. E. standard taper design.

## Passenger Gearset of Selective Type

The passenger car gearset is known as model 3-17. It is of the selective type and gives three forward speeds and one reverse. The gear ratios are as follows: First, 3.33:1; second, 1.68:1; third, 1:1; reverse, 4.35:1. Drop forgings of  $3\frac{1}{2}$  per cent nickel steel are used for the gears, which are cut with 6-8 pitch teeth of  $\frac{3}{4}$  in. face. The case is made of aluminum, with an integral bell housing of either type A, B or C, S. A. E. standard. The forward shaft end is machined to fit a Borg & Beck model D-A clutch, whereas the rear shaft end is machined to the S. A. E. standard taper or square dimensions. The design is arranged for a speedometer drive through helical gears from the main shaft back of the rear bearing and for driving a tire pump from the reverse idler. The control lever can be made of any length to suit the customer's requirements.

Longitudinal section of American Die & Tool Co.'s automobile transmission. The gears are of drop-forged nickel steel and the case of aluminum

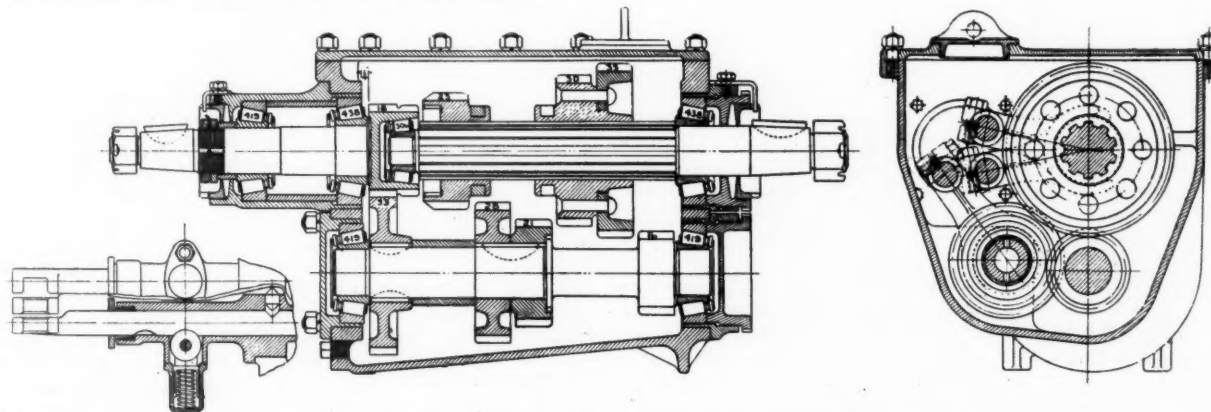


## MODEL 5A TRUCK GEARSET

Gears—6-8 pitch,  $1\frac{1}{4}$ -in. face, 20-degree pressure angle, drop-forged  $3\frac{1}{2}$  per cent nickel steel. Ratio—First, 4.01 to 1; second, 2.61 to 1; third, 1.50 to 1; fourth, 1.00 to 1; reverse, 4.85 to 1. Shaft ends—S. A. E. taper. Housing—Aluminum or cast iron

## MODEL 3-17 PASSENGER-CAR TYPE

Gears—6-8 pitch,  $\frac{3}{4}$ -in. face, drop-forged  $3\frac{1}{2}$  per cent nickel steel. Ratio—First, 3.33 to 1; second, 1.68 to 1; third, 1.00 to 1; reverse, 4.35 to 1. Shaft ends—E to fit Borge & Beck model D-A clutch. F—S. A. E. standard taper or square. Bell Housing—S. A. E. standard. Control lever, length D to suit requirements. Design arranged for connecting speedometer and tire pump on reverse idler



Three views of the truck transmission. The center drawing shows the ten-spline construction of the primary shaft. The drawing, left, is a detail of the sliding mechanism. The drawing at the right is a complete cross-section of the gearset

# Features of War-Truck Design

## Part III

### Woven Disk Universals Satisfactory—Brakes Not Adequately Protected — Demountable Tires Essential — Hotchkiss Drive Difficulties—Arrangement of Truck Trains

EDITOR'S NOTE—This is the last installment of a paper prepared by Mr. Thomas for the Summer Meeting of the Society of Automotive Engineers held in Washington, June 25 and 26

By Owen Thomas

**A**FTER following universal joint troubles into every corner I am convinced that woven disk universal joints will supersede the metallic lubricated joints ahead of the transmission and that they can be designed to give equal satisfaction behind the transmission even with the large gear reduction demanded in war service. I have examined many of the lighter leather joints which gave good satisfaction in London omnibus work but afterward failed in France, but the advantage of not needing lubrication and the actual success of later joints cannot be doubted.

With either type of joint the length of the propeller shaft and the angularity of the joints should be limited as much as possible by good design. The weight of the propeller shaft should be decreased by tubular construction.

#### Leather Cover To Retain Lubricant

In the case of any lubricated type of joint, leather covering should not be depended upon to retain the lubricant, but only to prevent dust, etc., from accumulating upon moving parts of the joint.

Some form of limited differential action is necessary. The truck with a free differential is hopelessly mired whenever one wheel drops into a hole. A standard spiral differential was thoroughly tested, but it was evident that the design was not liberal enough for the heavy service.

Many trucks were run without differentials. These gave surprisingly good results and instead of decreasing the tire mileage, as would be expected, the mileage appeared to increase. This could only be attributed to the decreased slip of the wheels on the granite block pavements and in the mud and holes nearer the front. These trucks would pull over almost impossible places and were the best evidence of the need of limited action. Other trucks were similarly fitted in Canada and used in the construction of camps with similar results. These trucks had 156-in. wheelbase and I have driven them on asphalt streets heavily loaded without being able to detect the absence of differential action.

#### Reversed Elliott Type Front Axles

Front axles of the reversed Elliott type are rapidly replacing the Elliott type in new war truck designs. This is due to the need of lower spring seats and higher steering connections together with the demand for straight steering knuckle tie rods. The ordinary axle is dropped to lower the center and give clearance under the engine. The tie rod is similarly dropped. To do away with the drop it is necessary to either raise the engine or lower the spring seats. To raise the engine spoils the design by increasing the angularity of the drive and by raising the floor of the truck. It also prevents the use of an internal drive axle in place of a worm axle, as with a layout giving absolutely straight line drive to a worm drive the angularity of the drive to an internal drive axle is all that can be permitted. To remedy this by dropping the axle seats without raising the engine means an axle with at least 3½-in. drop from the center of the wheels to the spring seats. Few Elliott truck axles have this drop and if

they have there is considerable bend in the steering arms to make them a proper height for a straight steering reach. The reversed Elliott caters much better to these conditions.

Brake design must be more liberal and much better in detail. Brakes give probably as much trouble by not properly releasing as by any other cause.

Both the cam, or toggle-operated segment, and the full wrapping brake give good service if the details are well worked out. Most of the former have too long segments to permit of the best operation, as the ends do not bear in the direction of the applied pressure and decrease rather than increase the braking action. Most of the latter are not well enough supported and centered in the released position to prevent rubbing against the drums, with consequent heating and wear.

#### Brakes Need Better Protection

Brakes must be much better inclosed and protected from the mud and dust than is usual. I have seen standing vehicles splashed on exposed brake parts until it was necessary to remove the wheels and thoroughly clean the parts before the vehicle could be operated.

Many trucks and cars have fair service brakes and inadequate emergency brakes. In France it is necessary to be able to slip the wheels with either set of brakes without exertion.

In general the brake levers should be longer and have more movement than is usual to allow of smaller stresses in the rods, and especially in the threaded adjustment points. They should be so planned that without adjustment except for the applied position of the pedal or hand lever all of the levers and parts will, until the brake band is worn out, be approximately at right angles to the pull when the brake is applied.

#### All Trucks Fitted with Demountable Tires

All trucks sent from Canada were fitted with demountable tires on standard S. A. E. rims. This was decided upon before the British had adopted the American pressed-on type with a view to easy replacement in the field. Two makes of steel were used in approximately even quantities. On both makes the locking rings and bolts and nuts were thoroughly galvanized. Most of the tires were carefully shipped fitted with wooden center struts to prevent distortion of the rims. Ample spare tire parts of all kinds were supplied. The subsequent use of these tires in the muddy condition in Flanders showed that they were much more difficult of replacement than the pressed-on type which is now standard on all British trucks. After the tires had been in use for some time in the mud they were removed only with the greatest difficulty, and once the rims had become rusted it was often impossible to remove them even in a tire press. The most effective way was to take out the remnants of the rubber and to jar and expand the rims with a sledge hammer. The pressed-on type on the contrary were very easily applied and removed in a tire press which was always to be found at every tire store. Tire presses also were fitted on to railway cars, which with a stock of tires were always available at rail head points. As the main function of the motor trucks was to ship



material and supplies from these same rail head points this method of replacement was a very simple matter.

Spare wheels with tires applied were always available at more advanced points, but these were necessary in any case to guard against the breakage of wheels and were easily used if there should be an emergency case of tire trouble in the field. Tires were almost universally pressed on with burlap strips. This was at first criticized, but it did not appear to cause any trouble, as with the general muddy condition it probably aided in the quick rusting on of the tire.

The standardization of the pressed-on type of tire on S. A. E. rims cannot be too strongly recommended. I am satisfied that the demountable type will be found wanting in war service in France.

It is extremely advisable to limit the number of sizes of tires to as few as possible. It is possible to use 5-in. tires for front wheels of all trucks as the smaller trucks are naturally faster-moving, and the additional speed will easily make the wear even. In France a great many of the trucks are used with 5-in. tires fitted dual on rear wheels. These dual tires developed quite serious troubles on account of the load often being concentrated on one of the tires only. On the granite block roads a projecting block on a damaged road would often cut out a large section of one of the tires. On heavily cambered roads the weights would concentrate on the inside tires.

#### Wide Single Rear Tires

I am convinced that the wider section single tires on rear wheels suffered less damage from these causes than the dual tires and I believe that a slightly convexed tread would give better service than absolutely flat tread tires. Many of the tires sent from America to France appear to be over-cured. In general they were harder and more liable to crumble than the European tires. On the other hand many of the more resilient tires gave trouble near the base and become detached from the steel ring.

Cast steel and pressed steel wheels are rapidly replacing wooden wheels. These should be finished on the outside to S. A. E. standards for pressed-on tires. The hubs should be standardized so that all makes of ball and roller bearings are interchangeable in them. The use of a separate flanged hub makes too heavy a construction. In general the smooth disk type is preferable to the open spoke type on account of the muddy condition.

Springs should be flat under load in both front and rear. Springs with not less than three reverse leaves and with a straight main leaf give the best service on account of less recoil on bad road surfaces. Several springs without spring eyes, pivotal fastenings or shackles have been tried with promising success, and combined semi-elliptic and cantilever springs are in use. The development of these makes possible the use of leaves of uniform thickness and length and promises to have a bearing on future production. Springs with a slow period are necessary and are worth quite a little study in development.

Several methods of avoiding bolts through the center of spring plates have been devised. In one an additional spring clamp is used in the center of the spring seat with a small pressed projection on each leaf. In another the ordinary clamps are used through a plate which goes on top of the spring seat for the purpose of holding the spring leaves assembled. The spring seats are counterbored to accommodate the clamping nuts.

Continuous round clamps over a semicircular saddle block are preferable to those having square corners.

The spring shackles at the rear end of the front springs should be in compression to allow of short brackets on the frame on account of difficulty already noted in connection with frames.

Although the use of rubber or spring bumpers is advisable to limit spring travel no bumpers of present construction give satisfaction. Some with much more liberal proportions should be developed.

This should receive serious attention. Whether oil or grease is used the lubrication method should be in the pin itself, as projecting oil and grease cups whether screwed in direct or through elbow fittings are constantly broken off or

lost. If a lubricating hole is uncovered for a mile the grit will enter and cut the parts regardless of the lubrication method.

#### Trouble with Hotchkiss Drive

There is no objection to a liberal Hotchkiss drive through flat springs with recoil plates; in fact this system properly designed has many advantages. However, many Hotchkiss drives gave trouble and so did many of the drives with radius rods and torque arms. With the low-gear reductions used now in the transmissions it is necessary to use very liberal wearing and bearing surfaces in the driving details of any system. I was able in every case of trouble which I investigated to place the trouble on the details rather than on the system used.

The same remarks are true of the various systems of mechanical drive to the wheels. All of the inclosed systems used gave success or failure according to the details of design. The chain drives were for the main part unprotected from mud and sand and so were working at a great disadvantage. A few were inclosed, but these suffered through inaccessibility. Under ordinary conditions the chain-drive vehicles were very efficient and easily maintained. The severity of the service and the bad weather conditions have finally ruled against the chain drive in favor of the fully inclosed types. In the newer designs, the worm drive, double reduction gears and internal drive gears have entirely superseded chain drive.

The best organized mechanical transport companies keep a careful mileage record of not only each truck but each unit in the truck. This is used as a basis of inspection, cleaning, lubrication and repair. The record systems vary, but are mainly based on the semi-daily reading of the hub odometer checked by a calculated distance according to the service done. For instance, the connecting-rod bearings will be inspected after a definite distance and be taken up if they show the slightest need. All of the units from the engine to the rear axle are washed out on a definite mileage basis. All companies have a proportion of reserve trucks and the ones to be worked on are placed in this reserve.

New trucks are numbered on the frame and on each of the units as well as on the body, and the service of each unit is separately recorded. Recognized number plates should be provided on the cases of each unit.

The hub odometers used could be much more liberally designed; the means of driving from the axle spindle particularly gives trouble in almost all cases.

In any truck it is an advantage to limit the number of tools necessary for ordinary operation. This is especially true of a truck for war service. Tools should be non-adjustable as far as possible. Several trucks in France are limited to the use of four sizes of bolts and nuts and one gets along with three. To handle four sizes needs but two double ended wrenches. The wrenches have an end socket and two side sockets set 15 deg. apart at each end; the small end of the large wrench fits the spark plug. Only socket wrenches should be allowed. The smallest thread used should not be less than  $\frac{3}{8}$  in. and these should not be used where there is any risk of twisting them off. The strength of a 200 lb. driver has more to do with breakages than the actual strain on a bolt in service. Only the best hand tools should be supplied. The ordinary \$3 set of tools in a canvas case is useless and never gets replaced. Tools should be standard for the whole service and should be bought in quantity from the tool makers and not with the vehicles.

The same is true of jacks. The average jack is useless; in the mud it is hard to maintain the best ratchet type jack. Stout bottle screw jacks in two lengths are the most practical. When a truck is mired it is impossible to use the jack except under the frame. To do this it is necessary to carry short lengths of plank and chains with strong clevises to chain the rear axles to the frame. Each truck must carry a sledge hammer, an axe, a crowbar and a shovel.

#### Arrangement of Truck Trains

A first aid truck and relief trucks accompany all truck convoys. These trucks run the last in the train and stop and help any truck that falls out of the line. If necessary, a relief truck will tow the straggler or take its load so that

the first aid truck can work on it. The traffic is arranged so that one class runs on each road and to a great extent in one direction only in order that vehicles may pass one another as seldom as possible. The ordinary motor truck route is from railhead toward the front until the roads are too bad and the loads are delivered to the smaller units of the horse transport. The truck then returns to railhead by another route. After they are reloaded they proceed again toward the front and somewhere on their route their rest camp will be situated. This location is chosen in as sheltered a spot as possible and it is moved whenever German guns or aeroplanes become too friendly. Here the reserve first aid truck, the workshop trucks and the stores trucks carrying supplies and repair parts are left working on the reserve trucks and units. The repairs done here are limited to those taking two days on any one unit. If engine bearings need scraping in slightly and tightening, this would be done, but if parts were broken, the unit would be taken to the railhead, shipped to the advanced base and another drawn in its place.

This work has to progress regardless of weather conditions, and all workshop, store and first aid trucks should be provided with a rolled up canvas shelter on a heavy roller on each side with suitable struts for the support of the roller. These shelters also are used as the headquarters office of the company where all of the clerical work incident to ordering parts, etc., is done.

It is necessary that each company shall be provided with adequate parts lists and as far as possible with bound loose leaf books of photostat reductions of the drawings of the trucks in use.

#### Workshop Trucks for Emergencies

The workshop trucks are fitted with machinery for small emergency repairs, although most of the repairs should be accomplished with standard finished parts. With trucks of European manufacture, the machine shop feature is more necessary than with interchangeable parts of American manufacture.

The machinery is mostly electrically driven and the current derived from the small direct-driven sets is also available for lighting. The store bodies are fitted on each side with steel bins with inclined bottoms for the reception of the small parts, bolts, etc.

Ambulances are for the most part on long-frame, specially built touring car chassis. The bodies are 8 ft. long and must not overhang the rear axles more than one-third of their length. To accomplish this, a wheelbase of about 145 in. is necessary. The bodies carry two drivers, an attendant, and four stretcher patients or eight sitting patients. With sitting patients, one-third of the weight of the patients and the three men is distributed between the two axles; the

other two-thirds of the weight of the patients is balanced directly over the rear axle. This is equivalent to more than the weight of eight men and their equipment, or a load of over 1600 lb. directly over the rear axle, exclusive of the body weight.

Ambulance rear axles, springs and tires have had to be made more liberal to stand the load. They are mostly fitted with dual pneumatic rear tires on account of this. Incidentally, the dual rear tires improve the traction about as much as an ordinary locked differential, and ambulances so equipped surprise the average driver in their ability on bad roads.

All ambulances are designed with a center aisle and a seat for the attendant on account of the number of serious cases which require these facilities. The average ambulance is very uncomfortable for sitting cases. The best arrangement is to leave the seat in position for the lower stretchers and to hinge the back upward for the upper stretchers in the opposite manner to the ordinary upper sleeping car berth. This arrangement provides a comfortable seat for sitting patients and also a pad under each stretcher to take the weight of stretcher patients when the ambulance strikes a bump. The side rails of the ordinary stretcher spring and the canvas sags in a very uncomfortable manner without such a support.

Steel runners for the stretchers should be channel shaped on one side only and flat on the other to allow for variation in the width of the stretchers, as the stretcher stays with the patient to the end of his journey and they are constantly changing.

Box or parcel bodies of practically the same type as an ambulance body are used on the same type of a chassis and might just as well be interchangeable with it except for the internal fittings. These bodies are used for light service such as mail, officers' mess cars and ammunition cars for motor-cycle machine gun batteries. Their loads and speed requirements are about the same as that of an ambulance.

Special officers' cars, some with sleeping arrangements, are also fitted to these chassis. To my mind they are better suited to the severe service than standard touring cars, besides the advantage of fewer types to maintain is the real slogan of the army automotive engineer.

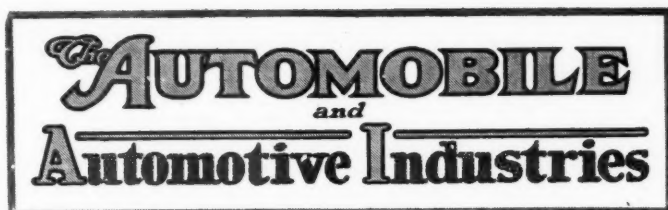
### Verdun Was Almost Lost

to France. The railroads were under fire from the Germans and could not be used. But under a painted roadway which deceived the enemy air-scouts, the motor-truck transports of the Allied armies—Bradley, special war correspondent of THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES, tells the rest of the story in our next issue.



A convoy of American trucks attached to the French army traveling along roads recently captured from the Germans in the north of France. Note the artillery horses drawn to the side of the road to let the motor truck convoy pass





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## Raw Materials Wanted

NEVER in the history of automotive industry has raw material been the cause of so much uncertainty as it is to-day. The purchasing agents of the country, who formerly could fill out their orders for materials and know that these materials would be delivered at the time specified and in the desired quantity, are fortunate now to be working more than a week ahead of production.

There are a great many causes for the shortage and in many cases final analysis shows the shortage is an artificial one. Probably one of the greatest elements to be contended with is that of uncertainty. The government, for instance, has not announced its requirements of certain materials and for this reason the mills have been holding in storage steel of the particular kind that it is known that the government will require.

This is, of course, the correct course to pursue inasmuch as government requirements come first, but it is to be hoped that, in the cause of general efficiency, the period of doubt will not be prolonged beyond what is absolutely necessary.

The much-harassed purchasing agent formerly could be found any day of the year seated in his office. To-day he and his subordinates are found scouring the country for the materials which a few months ago were plentiful. This means increased expense. It means that the industry is not only

spending more for its material, but it is spending thousands of dollars a year on following it up. It costs money to keep these men moving around the country and this money eventually comes out of the pocket of the consumer. For the sake of general efficiency, let us have the doubtful factor eliminated wherever possible.

## Women in the Drafting Room

A READER asks why there are no women employed for making mechanical drawings. We presume the question is prompted by difficulty in getting draftsmen and by a feeling that, inasmuch as recruiting and the draft will probably remove a large number of draftsmen from their work, their places will have to be filled by women.

There is no reason why women should not be able to do a great deal of the work done in a drafting room as efficiently as men. All tracing, for instance, could well be done by women, and most of the detailing as well. Ordinarily there is no difficulty in getting young men for this work, which is clean, easy and interesting, and which, while not paying very high wages offers chances for advancement to bright young fellows. Probably one of the reasons why women have not been employed for tracing and detailing in the past is that before a draftsman can do the more difficult work, such as layout and designing, he must become familiar with the practice followed in mechanical drawing and designing, and there is a great deal more to this than merely making neat drawings. He picks up this knowledge gradually while serving first as a tracer and then as a detailer. The usual process of evolving a competent designer by starting him in as a tracer and gradually advancing him as his aptitude warrants, is a rather tedious one. The length of time that a man must spend in each branch of the work is perhaps more dependent upon the amount of work in that particular branch than upon his capabilities.

There is no doubt that under the stress of war women will be employed for doing mechanical drawing, and we believe certain departments of the Government already have decided to advertise for women to work as "junior draftsmen." In Great Britain, women have long been employed for tracing. If experience with "draftswomen" proves satisfactory during the war period women undoubtedly will continue to be employed for that line of work later. The result would be that the period of education or training of mechanical designers would have to be shortened by courses of instruction supplementing practical work in the drafting room.

In the final analysis there are few classes of work done by men which women could not do if they had to, and in the belligerent countries in Europe women are at present employed in some lines requiring great physical exertion and in others demanding close concentration of mind. In both they are successful. But while there remains freedom of choice, women naturally will choose those occupations that require comparatively little physical effort, that permit of cleanliness and that do not require a protracted period of preparation.

## News of the Automotive Industries

### Republic Acquires Knight Tire

**New Corporation Capitalized at \$20,000,000—Knight Plant to Be Greatly Enlarged**

DETROIT, July 11—*Special Telegram*—The Republic Rubber Co. has acquired an option on the controlling interest on the Knight Tire and Rubber Co., which is held by Thomas L. Robinson, Guy E. Norwood and John T. Harrington. Plans are for a new corporation with capital of \$20,000,000. The Knight factory is to be greatly enlarged and in part immediately devoted to the construction of Republic tires.

New capital is to be expended for increasing the pneumatic tire capacity at Youngstown and Canton, for a very large increase in the truck tire capacity of Youngstown and for a considerable increase in the molded goods department of the Republic plant. No official statement yet is obtainable as to the price to be paid by the new corporation to Youngstown and Canton stockholders, but it is understood the transaction will be very attractive to all stockholders. As soon as option is fully exercised Mr. Norwood will also assume immediate charge of the Knight factory.

H. J. Woodward, general sales manager of the Knight company, is now made general sales manager of the Republic Rubber Co. C. W. Hardin, formerly vice-president of the Republic Rubber Co., New York, is now mechanical sales engineer at Youngstown. M. E. Murray, formerly assistant general sales manager at Youngstown becomes manager of the Chicago branch of the Republic Company. Mark W. Roe, formerly with the McGraw Rubber Co., becomes consulting engineer for the Republic. The Republic Rubber business in June was the largest in its history. It is expected that the sales volume of the new corporation will be \$18,000,000 a year.

#### New York Show Jan. 5 to 12

NEW YORK, July 7—Jan. 5 to 12 are the dates for the 1918 New York National Automobile Show in the Grand Central Palace, announced by the National Automobile Chamber of Commerce.

#### Saxon Securing \$1,000,000 Cash

DETROIT, July 9—The Saxon Motor Car Co. through its advisory committee, composed of Wm. J. Gray, First and Old Detroit National Bank; A. H. Zim-

merman, Continental Motors Co.; W. C. Rands, Motor Products Corp.; C. W. Dickerson, Timken-Detroit Axle Co., and Ralph Van Vechten, Continental and Commercial National Bank, is arranging to obtain \$1,000,000 additional capital, and this is to be secured by arrangements which are said to be practically completed, although full details of the new financing plan are not yet given out. The company has an over supply of raw materials due to a reduction of its 1917 output schedule, which necessitates the borrowing of approximately \$1,000,000.

#### 50,000 FORD TRACTORS FOR ENGLAND

DETROIT, July 11—England has contracted for 50,000 Ford tractors annually and the new Ford tractor factory at Cork, Ireland, will be capable of producing that number of machines yearly. These facts were stated here to-day by P. L. D. Perry, president of the Ford Automobile Co. of Great Britain, and C. E. Sorenson, manager of the Ford tractor plant at Dearborn, Mich., who have just returned from England.

It is planned to put the Cork plant into operation next spring, although difficulty of obtaining materials may delay its opening. It will employ 2000 men. There is no timber to be had in England, nor is there any metal supply, Mr. Perry says, so everything must be supplied from this country.

#### Ford's Bordeaux Plant Probably Seized

NEW YORK, July 10—It is rumored here that the French Government has seized the Ford plant at Bordeaux and is not allowing private owners to get parts. It is also stated that the price of 1916 Fords has gone up to \$1,300 on account of the prohibitive tariff.

#### France Prohibits Importation of Motor Vehicles

WASHINGTON, July 6—France has imposed a prohibition on the imports of motor vehicles, according to an announcement made by the Department of Commerce to-day. The department publishes the following cable from the American Consul General in Paris:

"Decision of Minister of Armament and War Material, upon advice of Inter-ministerial Committee on Woods, Metals and War Material, published July 1, provides that no further import permits for lorries (trucks) and automobiles will be granted, except to manufacturers producing proof that vehicles were shipped directly to France and Algeria before publication of decision."

### Springfield Body Refinances

**Plans Reorganization—Old Management Resigns—New Preferred Stock Issue**

NEW YORK, July 10—The Springfield Body Corp., organized about 2 years ago, is making arrangements to raise new cash by the sale of new preferred stock and the scaling down of common stock. Readjustment of the financial structure has been proposed by Spencer Waters, chairman of the stockholders' committee. His plan provides for an issue of \$640,000 new 8 per cent first preferred stock of which \$140,000 will go to present creditors. The balance is to be taken by the holders of the old preferred stock to the extent of 25 per cent of their holdings, the stock to be issued at par. The common stockholders are asked to give up 50 per cent of their holdings and are given the privilege of subscribing to new preferred stock. The common stock thus received by the company is given to those who subscribe for preferred stock. The old preferred stockholders who do not subscribe to new preferred must give up 25 per cent of their holdings. The present preferred stock becomes second preferred. The old management of the company has resigned, and new officials are being secured.

The creditors of the company, whose claims amount to \$420,000, are to take one-third cash, one-third in new preferred stock, and one-third in 1-year notes.

#### Assets May 15 \$500,000

On May 15, the company had current liabilities of \$683,000, and current assets of \$500,000, and the stockholders' committee.

Arrangements have already been made for the underwriting of \$250,000 of the proposed new preferred stock at par. The committee states that the company has about \$2,250,000 of orders on its books at a very fair profit.

#### Hinkley Motors Corp.—Not Titan

DETROIT, July 7—The Titan Motors Corp., organization of which was recently announced in an issue of THE AUTOMOBILE, has changed its name to the Hinkley Motors Corp. The change is made because it was found that the name Titan has been previously used. The company will first devote its activities to the manufacture of army truck engines.



## Plan Army Motor Supply Depot

Between Richmond and Norfolk—For Storage, Equipment and Repair Work

WASHINGTON, July 7—A large automobile, truck and motorcycle supply depot is to be established by the War Department at a point somewhere between Richmond and Norfolk, Va. This depot will be used primarily for the storage of motor vehicles and equipment destined for points abroad. It is understood that it will be one of the most important as well as one of the largest depots of this kind established anywhere in the country.

When the movement of National Guard troops to Europe begins, this depot will naturally be called upon to supply these forces with motor equipment. Also, it is probable the National Army forces will be supplied from this depot, regardless of whatever ports these forces embark from.

The plan of the department is said to be to maintain a force of mechanics at this depot, prepared not only to assemble parts of motor machines for shipment abroad, but also to make necessary repairs to machines which have seen service in the various training camps.

### To Approve Curtiss Toledo Factory Plans

TOLEDO, OHIO, July 10—Plans for Toledo's airplane factory will be approved Thursday at a meeting of directors of the Curtiss Aeroplane Co. The meeting is to be held in the office of C. M. Keys, 60 Broadway, New York. The plans for the big airplane plant to be erected in West Toledo have been completed by Mills, Rhines, Bellman & Nordhoff and now await the approval of the directors. It is probable that the ground will be broken immediately.

Overland engineers have been studying one of the English types of airplane engines which was installed at the Willys-Overland factory last Saturday. Special machinery for the manufacture of parts of the engine will be installed to take care of the work.

### Studebaker Offers Color Options

SOUTH BEND, IND., July 11—The Studebaker Corp. is now giving its purchasers of series 18 cars four options in colors and has a new top known as a gypsy top of semi-permanent type with the front part extended to cover the entire body of the car to the windshield. It is an evolution of the old Victoria type.

### Organize National Dealers' Assn.

CHICAGO, July 9—Dealers from all parts of the United States are arriving in this city for the purpose of organizing to-morrow the National Automobile Dealers' Assn. This is the name that has met

with the greatest favor in the preliminary deliberations of the provisional committee that has been in session all of to-day on such details as a suggested constitution and by-laws and classification of membership.

It is expected that between 100 and 200 men will be here when the first session is called at 10 o'clock Tuesday morning. Many of these, however, will be delegates from some of the biggest and strongest dealers' associations in the country.

### Chalmers Stockholders Favor Capital Increase

NEW YORK, July 11—Stockholders of the Chalmers Motor Corp. to-day voted in favor of increasing the capital stock from \$3,000,000, consisting of 600,000 shares without any nominal or par value, to \$14,200,000, consisting of 464,000 shares without any nominal or par value, and 264,000 shares with a preference as to principal of \$45 each. The preferred stock is entitled to \$3.50 a share per annum in dividends before any dividends can be paid on the common.

Another meeting will be held Aug. 8 at which it is believed all the questions as to management, etc., will be taken up.

### Automobile and Truck Factory Employees Exempt from Draft

WASHINGTON, July 10—It is believed that all employees of automobile and truck factories will be exempt, although each one so exempted will have to appear before the exemption boards. While there will be no exemptions from the draft as to classes, except those specifically exempted by the President, the United States will sift out and exempt from fighting services employees of munitions plants, shipbuilding plants and practically every branch of the industry that aid directly or indirectly in maintaining the military forces.

### FORD'S NEW MERCHANDISING POLICY

DETROIT, July 10—The Ford Motor Co. has inaugurated a new policy for merchandising Ford cars by which the sales manager of each Ford agency must intensively cultivate his territory. The plan comprises a map which shows clearly each township in the agency, the sections of the townships and practically every resident.

The sales manager is provided with thumb tacks of different colors and these are placed on the map. One color displays the number of prospects, another the 1917 Ford cars in the district, another the old Ford cars, another the other makes of cars, and a last tells those residents who have no cars. After the map is thus arranged the sales manager must fill in a blank sheet enumerating the same data as is told by the thumb tacks on the map. This is then sent to the Ford Motor Co. and informs it of the exact situation in every territory.

## Aviators Arrive at Selfridge Field

12 Hangars and Structures to House 150 Flyers Nearing Completion

MT. CLEMENS, MICH., July 10—Two units of the aerial service, the eighth and ninth squadrons of the signal corps, arrived at Selfridge Field from San Antonio, Tex., last Sunday. These units, comprising 400 men, contain flying instructors, wireless operators, mechanics and all workers necessary in a flying camp. Technical work preparatory to the reception of the aviation cadets started yesterday morning. Additional army units for guard duty and for aviation service will arrive here shortly. It is expected that by Aug. 1, the hangars, mess halls, barracks and countless other structures will have been painted and pavements will have been laid to do service as streets. Among the jobs nearing completion at the field is the construction of twelve hangars for airplanes, six barracks with a capacity for 150 men each, aerial repair shops, machine shops, truck garages, quartermaster's supply building, school building with six class rooms, hospital, officers' club, twelve mess halls and six buildings to quarter the commissioned officers and four to quarter the non-commissioned officers, administration building, blacksmith shop, water supply plant, power plant and fire protection plant. The hangars are 120 ft. long and have full width sliding doors, 66 ft., at each end to allow for the entrance and exit of airplanes.

### Fisk Buys Gibney Assets

PHILADELPHIA, July 10—Federal Judge Thompson has directed H. C. Thompson, Jr., receiver, to sell the assets of the Gibney Tire Rubber Co., Conshohocken, Pa., to the Fisk Rubber Co. for \$408,187.

The manufacture of solid tires will be continued to the fullest capacity of the plant and for the present as a branch factory of the Fisk company. The product will be marketed by the Fisk Rubber Co. of New York through its branch houses and through branches already established by the Gibney concern.

### Lelands Perfecting Plans

DETROIT, July 10—Henry M. Leland and son, Wilfred C. Leland, have returned to Detroit following a conference with Government officials in connection with their plans to manufacture airplanes for war service. Both are enthusiastic over the progress of details but are not yet prepared to make a definite public announcement. This may be expected in the near future.

The Lelands have both completely resigned from the Cadillac Motor Car Co. Their resignations were not to take effect until July 31 but arrangements were made so that they were enabled to leave the Cadillac plant last week.

## 22,625 Airplanes for U. S. Army

Also 45,250 Engines, Costing in All \$363,140,000—150,000 Men Needed

WASHINGTON, July 9—Drafts of administration bills for the great American aviation project which is to strike Prussian autocracy through the air have been transmitted to Chairman Dent of the House Military Committee, by the War Department. They propose, at first, building 22,625 airplanes and would appropriate \$639,000,000.

One bill provides for organization and personnel, and the other for appropriations. The personnel bill will be introduced by Mr. Dent at once and he will confer soon with Chairman Fitzgerald on the appropriations bill.

The administration draft of the personnel measures would vest very broad authority in the President in the organization of the service, including the power to raise men needed by draft, if necessary. It will be introduced as drawn by the War Department, but the committee will hold hearings before making a report.

### Navy Recommends \$45,000,000 for Aeronautics

WASHINGTON, July 9—Secretary of the Navy Daniels has recommended to Congress the appropriation of \$45,000,000 for naval aeronautics, in addition to the amounts already made available.

This money will be required to maintain and expand the existing schools and stations, to establish new stations and training schools, and to purchase the necessary aircraft, seaplanes, dirigibles and kite balloons for use on the high seas and from coastal stations at home and in co-operation with the Allies.

### Aero Base on Puget Sound

WASHINGTON, July 9—The Navy Department has secured an excellent site for a new aviation station and submarine base on Puget Sound in a tract of land fronting on Port Angeles Harbor, Wash.

### Freight Car Shortage Smaller

NEW YORK, July 11—There has been quite a drop in the freight car tie-up since the first of April. At that time there was a shortage of 148,627 freight cars. The latest figures available are those of June 1, when there was a shortage of only 105,127 cars. There has been little let-up in the shipments of automobiles, which are proving heavier from a few of the manufacturing centers.

### Lee Experimenting with Cord Tire

CONSHOHOCKEN, PA., July 6—The Lee Rubber & Tire Corp. is producing at the rate of 25,000 tires a month. The

original plans called for 20,000 per month.

The company is now experimenting with a new cord tire, and it is expected that if the experiments are successful this will be added to the regular tire and the puncture-proof tire now produced.

June was the most satisfactory month in the operations of the company so far this year. The company is producing at the rate of 1000 tires per day.

### Airplane Engine Laboratory at Bureau of Standards

WASHINGTON, July 7—Tests of airplane engines will be made at a laboratory at the Bureau of Standards. At a recent meeting of the subcommittee on power plants of the national advisory committee for aeronautics, preparations were made for the development at the Bureau of Standards of a laboratory for testing aircraft engines under conditions of altitude and temperature similar to those encountered in flights at an altitude of 20,000 ft. or more. The laboratory and its experimental equipment will be organized under the auspices of the advisory committee, and the investigations will be directed by the subcommittee on power plants.

### No War Contract Strikes

WASHINGTON, July 12—A special committee of the Council of National Defense has devised a plan for stipulating in Government contracts that all labor difficulties arising in carrying out the work shall be left to some Government agency for adjustment. The committee is composed of Secretaries Wilson and Redfield of the Council of National Defense and Daniel Willard and Samuel Gompers of the Advisory Commission.

### Kent Motors Men Indicted

NEWARK, N. J., July 12—A Federal grand jury yesterday indicted F. H. Clarke, president, and Dr. H. F. Clarke, secretary, of the Kent Motors Corp., and also F. J. Nagel and J. H. Simpson, who acted as the brokers in disposing of the stock of the Kent corporation.

### Australia Expects Shortage of Cars

SYDNEY, N. S. W., AUSTRALIA, July 2—An automobile shortage is expected in this country on account of the freight condition, which is going to be serious. Favorable action by the National Party, which has been returned to power through the Federal elections, is expected, however.

### Anti-Glare Headlights for Australia

SYDNEY, N. S. W., AUSTRALIA, July 1—Action against headlight glare is expected to be taken in the near future by the police in this country. The matter will be taken care of through the superintendent of motor vehicles, police department, in each of the capitals, viz.: Sydney, N. S. W.; Melbourne, Victoria; Brisbane, Queensland; Adelaide, South Australia, and Perth, Western Australia.

## Plan Defense Council Reorganization

President Considers War Preparation Largely Completed —To Set Prices

WASHINGTON, July 12—*Special Telegram*—Reorganization of the Council of National Defense and its various civilian committees has been undertaken by President Wilson, not from any spirit of criticism, but in view of a great part of the before-the-war task having been completed. The seven members of the civilian advisory commission have now submitted an inquiry to the Cabinet officers composing the Council of National Defense asking them what course the advisory commission shall pursue in view of Secretary Baker's recent letter, which warned the committees against price negotiations with manufacturers.

While it is known that the President has settled the price problem in his own mind, it is said he is withholding the announcement until the food control bill is passed by Congress, but will insist that the prices charged the American Government, American consumers and the Allies be identical. The fear is expressed that if profits are cut down, there will not be sufficient basis for the large excess profits tax contained in the revenue raising bill.

### Advisory Commission Out

Among the plans which the President is considering in connection with the reorganization of the Council of National Defense is one proposed by his Cabinet war chiefs, virtually shelving the council's advisory commission, with its scores of big business representatives on numerous committees.

The new plan proposes speedier war moves through a small group of six or seven men, each to head a specific branch of war activity. Those suggested for the business directorate of the war are principally the men on the present advisory commission, Daniel Willard, Howard Coffin, Julius Rosenwald, Bernard Baruch, and Frank A. Scott of the general munitions board.

The preliminary work of organizing the nation's business for war purposes as accomplished by the old advisory commission and subordinate committees under the defense council is regarded as finished. The President's war chiefs now desire a smaller group of business men with more centralized authority and responsibility to act as the medium between the army and navy on one side and the country's business and manufacturing interests on the other.

### Olin Finney & Co. Expand

PHILADELPHIA, July 8—Olin Finney & Co. have opened an office at 15 Broad Street for the purpose of handling business in New York, New Jersey and New England. This office will be in charge of P. T. Barbour, formerly automobile



manager of the New York Tribune and the Chicago Tribune.

The Finney system of automobile banking is a new idea in automobile financing, its distinctive features being that the Finney company finances the purchaser of the car rather than having the dealer finance the purchaser. Under the Finney system purchasers can borrow money directly from that company without calling on the dealer to finance them.

#### Fifth Avenue Coach Enters Manufacturing Field

NEW YORK, July 8—War conditions have forced the Fifth Avenue Coach Co. to go into the manufacture of its own trucks. This company has acquired property at 132d Street and Broadway for the erection of a four-story plant for the manufacture of motor buses. The proposed plant is estimated to cost about \$1,000,000.

The company has already assembled about sixty of its new trucks, and is planning to produce 200 in all, under its own specifications. The Moline-Knight engine will be continued with certain modifications.

Before the war started the company imported hundreds of buses from France, the majority of them being De Dions. Since then through its engineers it has designed its own trucks.

#### New American Six Roadster

PLAINFIELD, N. J., July 9—A new two-passenger sporting body is being developed by the American Motors Corp. in addition to the four-passenger roadster now ready. Production of the American Six is now going forward at the rate of four cars per day.

#### New Empire Four-Passenger Six

INDIANAPOLIS, July 10—The Empire Automobile Co. has brought out a four-passenger six-cylinder tourabout at \$1,285, designated as Model 71. This model has the same engine as Model 70A, a Continental, 3½ by 4½. The body has a clean cut taper from the back of the front seats to the extreme rear and also has a high narrow racing type radiator, sloping hood, staggered windshield, deep front cowl, and divided front seats.

#### Berwick Builds Armored Car

MAHANAY CITY, PA., July 5—The Berwick Car Works has produced an armored car for the United States Government. It has been shipped to the testing grounds at Sandy Hook, and if it is found to meet the requirements more of the same type will be constructed.

#### Dimmers on Illinois Cars

SPRINGFIELD, ILL., July 9—House bill No. 778 has been signed by Governor Lowden and is now a part of the State automobile law, making it mandatory to dim automobile lights when approaching another vehicle.

## Mexico Revokes Import Duty

### Dealers Win by Protest on Excessive Taxation on Automobiles—Better Business

LAREDO, TEXAS, July 10—As a result of strong protest on the part of automobile dealers of Mexico, the federal government of that country has revoked that part of its import taxation decree which placed an import duty of 60 cents Mexican gold per kilo of 2.20 lb. on automobiles. This duty was to have gone into effect July 1 and the knowledge that the heavy tax was to be imposed caused a great rush of shipments of automobiles into Mexico from the United States during the months of May and June.

The duty would have been practically prohibitive, as it meant that a car weighing 1000 lb. would have had to pay import duty amounting to \$450 Mexican gold, which is about \$225 American money. The larger and heavier automobiles would have had to pay a still greater amount of duty, and this would have made them too high priced to sell in Mexico.

Now that the import duty has been entirely removed, it is expected that there will be built up a large trade in American automobiles in Mexico. New garages and salesrooms are being opened in all of the larger cities and orders are being placed for many new cars.

#### Cycle Convention at Atlantic City

ATTLEBORO, MASS., July 9—The Cycle Parts and Accessories Assn. will hold its eleventh annual convention of all the cycle trade industries at the Hotel Traymore, Atlantic City, N. J., from Aug. 6 to 10.

#### United Motors Trucks Increases Prices

GRAND RAPIDS, MICH., July 11—The United Motors Co. has increased the prices on the worm-drive trucks. The 2-tonner has been increased from \$2,250 to \$2,350; the 3½-tonner, from \$2,900 to \$3,150; the 4-tonner from \$3,200 to \$3,450; the 5-tonner from \$3,900 to \$4,250. No advance has been made on the tractors.

The tractor production is now in progress. One hundred tractors will be produced this month. Two hundred a month production will be maintained commencing Aug. 1.

#### Chance to Oppose Taxation Rates on Advertising, Etc.

WASHINGTON, July 9—The chances are it will be weeks before the war revenue bill comes before the Senate for consideration in view of the notice given by Senator Simmons, chairman of the committee on finance, that he would ask the recommitment of the revenue measure in order that provision may be made for taxes to take the place of that ex-

pected to be lost by reason of the further manufacture of distilled spirits being forbidden under a Senate amendment to the food control bill.

This means that those who oppose provisions in the revenue bill as drawn, such as the tax on advertising, increased rates of second class postage, etc., will be given further opportunity to present their arguments in opposition to such taxation.

#### Krom-nik Gear to Sell Differentials

CHICAGO, July 5—The Krom-nik Gear Co. has been organized here to take over the exclusive distribution of M. & S. differentials and of Anderson rolled gears. Lewis H. Scurlock, vice-president of the M. & S. company, is president of the new organization. J. W. Fulton and J. S. Houston are vice-president and secretary-treasurer respectively.

#### Paige Increases Car Prices

DETROIT, July 3—The Paige Motor Car Co. has increased the prices of its products, effective July 15, as follows: Stratford 6-51 seven-passenger, \$1,495; Fairfield 6-46, seven-passenger, \$1,375; Linwood 6-39, five-passenger, \$1,175; Brookland 6-51 four-passenger, \$1,695; Dartmoor 6-39, two or three-passenger, \$1,175; limousine 6-51, seven-passenger, \$2,750; sedan 6-51, seven-passenger, \$2,750; sedan 6-39, five-passenger, \$1,775, and town car 6-51, seven-passenger, \$2,750.

#### Chevrolet Increases Price

FLINT, MICH., July 9—The Chevrolet Motor Co. increased the price of its "model 490" touring car from \$550 to \$635, effective Aug. 1.

#### Liberty \$155 Higher July 21

NEW YORK, July 6—Prices of Liberty cars will be raised \$155 on July 21. The prices at present are \$1,195 for the two and five-passenger cars, \$1,795 for the coupé and \$1,395 for the sedan.

#### Madison Price Increase Near

ANDERSON, IND., July 11—The Madison Motors Co. will increase its prices about \$200 within the next 30 days.

#### Jordan Roadster Sells for \$1,795

CLEVELAND, July 6—The new Jordan 60 roadster sells for \$1,795 with wood wheels and \$1,895 with wire wheels. In THE AUTOMOBILE for June 21 these prices were erroneously given as \$1,895 and \$1,950 respectively.

#### Campbell Cotter Pin Prices Higher

NEW YORK, July 10—The American Chain Co. has rearranged its list prices and discounts on its hammer-lock self-spreading cotter pin. The lighter sizes are higher in price while the larger sizes are lower.

## No Export Embargo On Cars

Includes Kerosene, Gasoline  
and Steel—Licenses Required  
For Shipments Abroad

WASHINGTON, July 9—The new export control legislation which will become effective under proclamation by the President will affect oils, kerosene and gasoline, pig iron, steel billets, scrap iron and scrap steel, but it will not affect automobiles, trucks, farm tractors, motorcycles and airplanes.

Such articles as are put in the control list by the proclamation of the President, if exported, will have to be shipped under specific permission of the export board. This means that licenses must be secured for export purposes. The Bureau of Foreign and Domestic Commerce, through its various branch offices, will act upon applications under such licenses for export privileges of specified articles. In granting permission to export articles placed under embargo, according to the commerce department, the authorities will be controlled by three things.

These are, first, whether such exportation would tend to cause a stringency with consequent high prices in this country; second, whether such exportation would tend to make it possible for Germany to be aided by any possible surplus in the hands of neutrals; third, whether such exportation would aid in equally distributing the supply of food, fuel and iron among the allied nations.

### Hudsons Feature Tacoma Races

TACOMA SPEEDWAY, July 4—Between 15,000 and 20,000 saw Patterson in a Hudson win the 150-mile Pacific Coast Championship event on the Tacoma Speedway and incidentally break the track record, traveling 90.4 m.p.h. for

the 150 miles. Roads and Malcolm, in Hudsons, took third and fourth places respectively. Cliff Durant, in a Chevrolet Special, took second place. The unofficial time of the winner was 1:47:2.

The 50-mile consolation event, in which four cars started, was won by Jimmy Crosby in a Duesenberg special, the distance being covered in 39 min. Clyde Roads in a Hudson was second and Hans Malcolm, Hudson, third. Time, 1:20:2.

A perfect day of racing was marred by the death of the popular Tacoma driver, Conrad Hanson, who with his mechanic, Fred W. Johnson, in their Hudson mount, left the track just a few yards below the spot where Carlson was killed 2 years ago, and where Dingley came within a hair's breadth of losing his life a few years earlier. The accident happened in the eighteenth lap, when Hanson was in seventh place and vainly trying to nose out his nearest competitor.

### England Restricts Machine Tool Trade

LONDON, June 30—The Minister of Munitions has given a notice of the withdrawal of a general permit to purchase or negotiate for purchases of machine tools and machinery driven by power for metal working. All applications for permit to purchase or to enter into negotiations for such machinery are now made to executive officers of Area Clearing House boards, whose addresses may be obtained from Director Central Clearing House, Ministry of Munitions, Charing Cross Building.

### Dart Trucks to Specifications

WATERLOO, IOWA, July 7—The bid of the Dart Motor Truck Co. on 1 to 5000 Class A army motor trucks was at \$2,975 per vehicle. A typographical error made this appear \$2,475 in the list of bids published in THE AUTOMOBILE for June 28. The Dart bid was in accordance with Government specifications with two or three small exceptions in detail.

## May Exports Total \$11,422,596

\$2,000,000 Increase Over April  
—Trucks Show Big Gain—  
Canada Biggest Buyer

| 1917  |       |             |        |             |             |
|-------|-------|-------------|--------|-------------|-------------|
| Mos.  | Cars  | Value       | Trucks | Value       | Parts       |
| May   | 6,725 | \$5,489,980 | 1,764  | \$3,216,620 | \$2,715,696 |
| April | 7,276 | 5,166,640   | 1,039  | 2,416,368   | 2,157,981   |

| 1916 |       |           |           |
|------|-------|-----------|-----------|
| May  | 6,275 | 4,069,690 | 1,717     |
|      |       | 4,357,238 | 2,426,206 |

WASHINGTON, D. C., July 9—Exports of automobiles, trucks and parts in May were increased nearly \$2,000,000 over April and about \$1,000,000 over May, 1916. Motor truck shipments showed the biggest gain during that month, being valued at \$3,216,620, and numbering 1764, compared with 1039 in the previous month valued at \$2,416,368. Passenger car exports made a slight gain from 7276 valued at \$5,166,640 to 6725 valued at \$5,489,980. Parts shipments showed a small gain from \$2,157,981 to \$2,715,696.

Canada again proved to be our biggest buyer, her purchases totaling \$2,025,797 against \$2,092,823 for the previous month. England increased her purchases from \$1,428,241 in April to \$2,092,823 in May.

There was a decrease in purchases of American cars from the United States by the South American countries. Australia also showed a decline, as did Denmark.

During the 9 months ending May, 1917, American shipments of cars and trucks totaled \$82,260,292 as against \$91,594,466 in the similar period of 1916. Parts shipments in the 1917 period totaled \$24,517,954, compared with \$20,649,739 in the same period of 1916. Great Britain has bought \$16,117,958 worth of cars and trucks so far and France is a close second with purchases amounting to \$14,211,306. Canada is third with \$10,401,326.

### Exports of Automobiles, Trucks and Parts for May and 10 Previous Months

|  | May   |              |       |              | Ten Previous Months |               |        |               |
|--|-------|--------------|-------|--------------|---------------------|---------------|--------|---------------|
|  | 1916  |              | 1917  |              | 1916                |               | 1917   |               |
|  | No.   | Value        | No.   | Value        | No.                 | Value         | No.    | Value         |
| Passenger cars                         | 6,275 | \$4,069,690  | 6,725 | \$5,489,980  | 51,326              | \$38,340,066  | 57,201 | \$42,885,731  |
| Commercial cars                        | 1,717 | 4,357,238    | 1,764 | 3,216,620    | 19,849              | 53,254,400    | 14,740 | 39,374,561    |
| Parts, not including engines and tires | ...   | 2,426,206    | ...   | 2,715,696    | ...                 | 20,649,739    | ...    | 24,517,954    |
| Total                                  | 7,992 | \$10,855,134 | 8,489 | \$11,422,596 | 71,175              | \$112,294,205 | 71,941 | \$106,778,246 |
| By Countries                           |       |              |       |              |                     |               |        |               |
| Denmark                                | 210   | \$144,737    | 24    | \$30,009     | 807                 | \$556,445     | 1,267  | \$1,004,078   |
| France                                 | 877   | 1,764,489    | 530   | 694,687      | 7,080               | 18,054,753    | 5,239  | 14,211,306    |
| Germany                                | ...   | ...          | ...   | ...          | ...                 | ...           | ...    | ...           |
| Italy                                  | 51    | 19,376       | 172   | 231,927      | 307                 | 192,107       | 250    | 282,857       |
| Russia in Europe                       | 359   | 660,620      | 69    | 181,972      | 5,133               | 15,528,974    | 2,423  | 6,217,958     |
| United Kingdom                         | 975   | 1,745,415    | 1,242 | 2,092,823    | 17,795              | 24,705,017    | 6,721  | 16,117,419    |
| Other Europe                           | 404   | 392,189      | 573   | 582,738      | 2,149               | 2,651,331     | 4,348  | 3,642,931     |
| Canada                                 | 1,779 | 1,212,260    | 2,450 | 2,394,112    | 9,212               | 6,368,633     | 13,001 | 10,401,326    |
| Mexico                                 | 58    | 53,500       | 523   | 265,678      | 396                 | 381,818       | 2,020  | 1,184,793     |
| West Indies and Bermuda                | 495   | 296,798      | 320   | 208,880      | 4,355               | 2,642,466     | 4,761  | 3,672,368     |
| Argentina                              | 578   | 279,736      | 405   | 265,075      | 4,075               | 1,910,679     | 3,853  | 2,320,688     |
| Brazil                                 | 32    | 14,944       | 135   | 76,531       | 236                 | 142,191       | 758    | 441,006       |
| Chile                                  | 69    | 62,736       | 152   | 158,236      | 773                 | 527,291       | 2,128  | 1,583,562     |
| Venezuela                              | 16    | 12,025       | 16    | 13,876       | 432                 | 276,495       | 519    | 334,548       |
| Other South America                    | 94    | 63,355       | 428   | 288,230      | 547                 | 319,643       | 2,049  | 1,264,930     |
| British East Indies                    | 367   | 270,432      | 261   | 200,656      | 2,834               | 2,145,615     | 4,692  | 3,534,129     |
| Australia                              | 934   | 660,862      | 339   | 305,431      | 7,043               | 5,661,675     | 4,774  | 3,629,220     |
| Asia and other Oceania                 | 558   | 687,468      | 708   | 611,063      | 4,736               | 6,148,853     | 8,589  | 9,198,760     |
| Other countries                        | 136   | 85,986       | 142   | 104,684      | 3,265               | 3,380,480     | 4,549  | 3,218,413     |
| Total                                  | 7,992 | \$8,426,928  | 8,489 | \$8,706,600  | 71,175              | \$91,594,466  | 71,941 | \$82,260,292  |



## Factory Activities

CLEVELAND, July 6—The Peerless Motor Car Co., building fifteen trucks per day for the Allies, has been obliged to extend its factory so as to care for its production of passenger cars, and a new warehouse 400 by 48 ft. has just been completed.

WINDSOR, ONT., July 9—The factory now being erected here by the Maxwell Motor Co. when completed will cost \$500,000. It will be only a short period until the manufacture of Maxwell cars will be a Canadian industry. Two hundred men are to start work in the factory as soon as the first building is ready. When all the factory buildings are completed, 1000 men will be employed. The distribution of Maxwell cars in Canada is a large factor at present in the company's annual output. This big amount of business is in spite of war conditions and the heavy 42½ per cent import duty on automobiles entering Canada.

DETROIT, July 9—The Continental Motor Co., opened to-day after a shut-down of 4 days made for machinery readjustments, will make truck engines as well as passenger car engines in its Detroit factory. Heretofore the company manufactured passenger car engines exclusively, and the truck engines have been turned out exclusively by the Muskegon plant.

SPRINGFIELD, ILL., July 9—It has been decided to add automobile accessories to the products manufactured by the Fred R. Coats Co., Harvard Park, Ill., a suburb of Springfield. Valves, valve stems, bearings, etc., will be specialties. The plant has grown until seventy-five men are now employed. It is expected to increase this number to 110 to 125 to take of the additional lines.

COLUMBUS, OHIO, July 9—The Ohio Carriage Mfg. Co. is developing in connection with its own business an automobile robe and coat department.

SCRANTON, PA., July 6—The Maccar Truck Co. is having plans prepared for a one-story addition, about 40 by 65 ft.

ARDMORE, PA., July 6—The Autocar Co. is having plans prepared for a five-story reinforced concrete addition.

FOSTORIA, OHIO, July 9—Work has been started on a new plant for the Dale Body Co. The company will manufacture bodies for the Allen Motor Co. The structure will be fireproof and of modern construction. It will have 30,000 sq. ft. of space and the plant will be capable of turning out 100 bodies a day.

APPLETON, WIS., July 9—The Appleton Auto Body Co., organized in Feb-

ruary to manufacture a varied line of bodies for passenger and commercial cars, Ford-truck units, etc., has outgrown its plant and is now making preliminary arrangements for the erection of new works during the fall and winter. Details, however, are not yet ready for publication. C. C. Seeger is vice-president and general manager.

BURLINGTON, WIS., July 9—The Universal Valve Co., Chicago, Ill., has moved its general offices to Burlington, where its products have been manufactured under contract for a number of years by the Burlington Brass Co. The removal is made for the obvious reason that the company wishes to bring its manufacturing and marketing divisions closer together. The Burlington offices are in direct charge of J. B. Knudsen, vice-president and treasurer, who has moved from Chicago to that city. The company's specialty is a non-jacking valve for high-pressure purposes.

STEVENS POINT, WIS., July 9—The Bukolt Mfg. Co., manufacturing Highway tire protectors, moved into its new plant during the past week and will now expand its production more than fourfold. Even with the increased facilities the entire force is working overtime and the carbonizing furnaces for the metal parts of the protector are being operated day and night, including Sundays.

During the week, the Bukolt company made a shipment consisting of a consignment of 122 bundles of Highway protectors, weighing 5520 lb. The consignee was the Havre Tire Protector Co., Havre, Mont., which recently contracted for 50,000 sets of protectors for delivery within 1 year for distribution in the state of Montana.

APPLETON, WIS., July 9—The Killen-Strait Tractor Co. is rushing work on a new foundry building in which it will henceforth manufacture all of the castings required in the making of its machines. Until now the raw castings have been purchased from outside foundries and machined in the Appleton plant. During the last year the company's requirements of castings have more than doubled.

AKRON, July 9—The Amazon Rubber Co. has installed a complete chemical laboratory in its plant for the purpose of making exhaustive experiments in rubber along new lines, as well as to further perfect, if possible, its tires and tubes. H. L. Arbogast, who was formerly assistant chemist of one of the large local factories, has been given charge of the department.

LA CROSSE, WIS., July 3—A 10 per cent bonus for the employees of the

La Crosse Tractor Co. will be given to all the men who remain with the company until Nov. 1. This offer on the company's part was made to reduce labor turnover and to assure the production of 1000 tractors this year.

SOUTH BETHLEHEM, July 9—The Silvex Co. has purchased 10 acres of land adjacent to this city and will erect a new plant. It is expected that the capacity of the plant will be 12,000,000 spark plugs a year.

AKRON, July 7—The Miller Rubber Home & Land Co. is the name of an organization formed by employees of the Miller Rubber Co. to aid in securing homes in the Rubber City. The authorized capital is \$100,000, and the incorporators are: William F. Pfeiffer, R. R. Jennings, Richard T. Griffiths, F. C. Millhoff and J. M. Doran.

AKRON, July 6—The Miller Rubber Co. yesterday opened a cafeteria for its factory employees, who now number 3009. The cafeteria has been carefully installed and every detail is provided for equipment, convenience and service. The kitchen outfit has been designed along strictly modern lines and the prices for food are on a cost basis.

DETROIT, July 10—The Republic Motor Truck Co. will immediately erect a large addition to its plant at Alma, Mich., and will double its production capacity.

DETROIT, July 7—The Packard Motor Car Co. will erect a sales building of eight stories to cost \$1,200,000.

ST. LOUIS, Mo., July 9—The Moon Motor Car Co. now has a selling representative in every country in the world. A contract has been closed with M. Berci, of the Anglo-American Export Agency, to sell its cars in all European countries, the British Indies, Ceylon, Dutch East Indies, Straits Settlement, Malayan States, Siam, China, Japan, Korea, Egypt and the Sudan.

### Enger Property Sold for \$70,000

CINCINNATI, OHIO, July 6—The factory and sites of the Enger Motor Car Co. have been authorized to be sold to William Magly at his bid of \$70,000. The receiver has \$88,129.87 on hand, not including the \$70,000 from the sale of the property. Among the creditors' claims there is \$180,000 disputed, including \$60,000 by the Fifth-Third National Bank.

RACINE, WIS., July 9—To accommodate the largely increased demands for power because of additions and enlarge-

ments of its plant, the Racine Rubber Co., manufacturing Racine Trusty Tread, country road and plain tread casings, is undertaking an extensive improvement and enlargement scheme in its steam generating plant. It is said that much additional equipment will be installed and the existing machinery brought strictly up-to-date by replacements where necessary.

#### To Sell Pullman Assets July 24

YORK, PA., July 7—Judge Charles B. Witmer, of the United States District

Court at Sunbury last Monday signed a decree authorizing W. A. Keyworth, Carlton L. Hoff and Henry D. Schmidt, receivers of the Pullman Motor Car Co., to sell at public sale on July 24 all of the assets of the Pullman Motor Car Co. Two different guarantees were presented and considered by Judge Witmer, who rejected both and ordered a sale without guarantee and for the highest dollar.

ELYRIA, OHIO, July 10—Two Elyria plants are to make war materials. The

Willys-Overland plant here is to manufacture airplanes on a large scale; the Garford Mfg. Co., maker of automobile horns, is beginning work on wireless telegraphy equipment to be used on submarines.

DETROIT, July 10—The Zenith Carburetor Co. has contracted for the erection of a new four-story factory.

DETROIT, July 10—The Firestone Tire & Rubber Co., of Akron, Ohio, will spend \$20,000 for building extensions for its Detroit branch.

## Personals

DETROIT, July 7—Cornelius T. Myers, consulting engineer, has been appointed chairman of the chassis builders' committee, in Washington, for standardization of the class A army motor truck. Mr. Myers is working upon a design to be submitted to a conference of United States army officers and motor truck builders this week.

WASHINGTON, July 9—James C. Mars, of the Aero Club of America, New York, has been commissioned a first lieutenant in the Aviation Signal Corps of the Army.

PONTIAC, MICH., July 10—Fred W. Thomas has been appointed assistant engineer of the Olympian Motors Co., Pontiac, Mich. Mr. Thomas was formerly chief engineer of the Clark Engine & Boiler Co.

LANSING, MICH., July 9—R. L. Leigh has been made division sales manager of the Olds Motor Works. He will cover the territory extending from the Atlantic coast to and including Michigan, Ohio, Georgia and Florida. Leigh was with the Reo Motor Car Co. for several years engaged in similar work.

DETROIT, July 5—Robert S. Stewart, vice-president of the United States Motor Truck Co., has been appointed executive officer in general charge of the company. Forest J. Alvin, formerly sales manager, has been appointed general manager and director of sales. These changes were made because President R. C. Stewart, of the United States Motor Truck Co., will devote his efforts to the Stewart Iron Works, of which the truck company is a subsidiary.

PONTIAC, MICH., July 10—St. Clair Couzens has been made advertising and sales manager of the Olympian Motors Co. Mr. Couzens was formerly advertising manager of the Pathfinder Co. of Indianapolis, Ind.

DETROIT, July 6—Fred Cardway has been appointed manager of the export department of the Packard Motor Car Co. The Packard company has reorganized its export department in line with the present development of export

business in South America, Africa, Australia and the far East. Mr. Cardway last winter made a trip to South America and established Packard dealerships in Rio de Janeiro, Buenos Aires and Montevideo.

CHICAGO, July 10—Berry Rockwell, formerly with the McAvoy Advertising Agency, in Chicago, has been made general sales manager of the Smith Motor Truck Corp., and has already assumed his new duties.

TOLEDO, July 5—F. H. Thompson has been appointed general traffic manager of the Willys-Overland Co. Mr. Thompson, who succeeds C. W. Eggers, was formerly assistant general freight agent of the Michigan Central Railroad at Detroit.

TOLEDO, July 9—Eugene Prince, factory representative of Willys-Overland, Inc., in Russia, has temporarily severed his connections with the company to join the diplomatic mission, which is headed by Elihu Root.

ST. LOUIS, MO., July 6—Paul A. Smith has become general manager of the Overland Automobile Co. He was former district sales manager for the West Central district. Previously T. L. Hausmann has been both president and general manager of the company. G. W. D. Donnelly remains retail sales manager, and E. E. Denniston wholesale sales manager. Before joining the Willys-Overland company Mr. Smith was sales manager of the Detroit Steel Products Co.

MOLINE, ILL., July 7—Prof. H. L. Thomson, who has been in charge of farm engineering for the Oklahoma Agricultural College, has been placed at the head of the research department of the Moline Plow & Tractor Co.

DETROIT, July 9—R. B. Dickson, who has been battery service station supervisor for the Prest-O-Lite Co., Inc., in its Detroit territory, has been appointed division manager of the Indianapolis territory, with headquarters at the Indianapolis down-town branch.

In his new capacity, Mr. Dickson has

charge of the sales development of the Prest-O-Lite products in a territory including most of Indiana, and parts of Ohio, Illinois and Kentucky. He succeeds Major W. P. Carpenter, who has been called to the colors.

CHICAGO, July 9—Malcolm MacKinnon, of Rockford, father of three highway movements in Illinois, was made manager of the newly organized Touring Club of America at a meeting of the directors at the new headquarters of the T. C. A. at the Chicago Automobile Club Tuesday.

ALMA, MICH., July 9—Lafayette Markle has become vice-president and assistant general manager of the Republic Motor Truck Co. Mr. Markle resigned as president of the L. Markle Co. of Chicago to assume his new position. Lafayette Markle has been in the automobile business since 1899, and is one of the best known individuals in the industry.

NEW YORK, July 12—F. H. Tackaberry, general agent of the American Steel Export Co., sailed Saturday for South America.

Mr. Tackaberry will cover a large portion of the Latin-American countries, visiting the following important cities: Rio de Janeiro, Sao Paulo, Buenos Aires, Montevideo, La Plata, Rosario, Valparaiso, Santiago, etc.

COLUMBUS, OHIO, July 9—C. E. Reynard has accepted a position as district representative with the Lawrence Motor Co. Reynard will have charge of the outside territorial organization. Leonard T. Smith has been appointed local representative of the Lawrence Motor Co., Springfield. The Lawrence Motor Co. is central Ohio distributor for the Republic and Vim trucks.

PITTSBURGH, July 7—S. L. Nicholson, who has been sales manager of the Westinghouse Electric & Mfg. Co. since 1909, has been promoted to the position of assistant to vice-president, with headquarters at East Pittsburgh. H. D. Shute, whose election as vice-president of the



company was recently announced, will have executive charge of the company's commercial organization, both domestic and export, succeeding Vice-president L. A. Osborne, whose headquarters have been transferred to New York.

#### OFFICERS ELECTED

DETROIT, July 6—W. R. Angell has been elected secretary of the Continental Motor Corp. He succeeds A. H. Zimmerman, formerly secretary-treasurer, who continues as treasurer. Mr. Angell has been a large stockholder in the company for several years and has been in Detroit since January when the rapidly increasing business of the Continental company necessitated refinancing.

NEW YORK, July 7—Ralph D. Mock, treasurer of the Hydraulic Pressed Steel Co., Cleveland, has been elected a director of the American Motors Corp.

CARO, MICH., July 5—Officers of the Great Lakes Aeroplane Co. were elected last Tuesday as follows: Directors, L. G. Seeley, W. J. Moore, F. A. Luthy, Clark Daugherty and Fred Hosp; president and general manager, F. A. Luthy; vice-president, W. J. Moore; treasurer, L. G. Seeley; secretary, Clark Daugherty.

DECATUR, ILL., July 7—Directors of the Comet Automobile Co. have been elected as follows: P. S. Gordon, Racine, Wis.; G. W. Jagers, Decatur; W. M. Lewis, Decatur, Ill.; J. L. Bennett, Decatur, and F. T. Keisacker, Springfield, Ill.

#### NEW COMPANIES

ST. LOUIS, Mo., July 10—The Moon Motor Car Co. has been incorporated at Dover, Del., as a holding company for the Moon Motor Car Co. of Missouri, having acquired the entire property and interests of the Missouri concern. There will be no change in management or property interests, the only object being to take care of additional factory property and facilities recently acquired and which were rendered necessary by the rapid growth of the company in the past 2 years.

The capitalization of the Delaware company is \$600,000 preferred stock, of \$100 par value per share, and 180,000 shares of stock of no par value. Incorporators are C. L. Rimlinger; Henry M. Robinson, Wilmington, Del., and Clement M. Egner, Elkton, Md.

#### Iron City Products Co. Formed

PITTSBURGH, July 11—The Iron City Products Co. has been formed by local interests to enter the automotive field. The company is now testing out a number of inventions bearing upon the increased efficiency of automotion and will take up and exploit such of these as meet with their requirements. The trademark ICP will be placed upon such articles. The company has been marketing a piston ring which will be pro-

duced in large quantities in the new factory.

E. E. McCoy of this city is president of the company. He was formerly an officer and director in the Keystone National Bank of Pittsburgh. E. E. Arnold is vice-president. He was formerly with the Westinghouse Machine Co., A. O. Smith, and lately chief engineer in charge of design, sales engineering and plant development of the New Departure Mfg. Co.

Among the other directors are J. M. Hansen, president of the Standard Steel Car Co.; W. B. Rhodes, a well-known capitalist, and R. M. Atwater, Jr., consulting engineer for Ladenburg, Thalman & Co. of New York.

The new model factory building of the Iron City Products Co. on the main line of the Pennsylvania Railroad in the East Liberty section of Pittsburgh, is now nearing completion.

NEW YORK, July 9—The Witherbee Storage Battery Co. and the Meder-Staudt Co. have been merged. There will be no change in the personnel or management of the company.

#### Chandler Earns \$20 a Share

CLEVELAND, July 6—Earnings of the Chandler Motor Co. for the first 6 months of 1917 were equivalent to over \$20 per share compared with \$24 per share for the full year of 1916.

The company in 6 months manufactured and sold approximately 11,000 cars, and shipments in June were in excess of 2000 cars. There has been no falling off in sales of Chandler cars, it is stated, and the company is well covered in materials and supplies.

#### Ajax 6 Months' Earnings \$1,359,418

NEW YORK, July 12—Net earnings of the Ajax Rubber Co. for the first 6 months of the current calendar year amounted to \$1,359,418, the largest amount for a similar period in the history of the company. On the basis of returns for the first 6 months of this year the company should earn in the neighborhood of \$20 a share on its outstanding stock for the full 12 months to end Dec. 31 next. Earnings for the half year to June 30 were equal to approximately \$10 per share.

#### CAPITAL CHANGES

ANN ARBOR, MICH., July 6—The King Trailer Co. has increased its capital from \$50,000 to \$150,000.

DETROIT, July 6—The Wadsworth Mfg. Co., maker of automobile bodies, tops, etc., has increased its capital stock from \$250,000 to \$650,000.

JANESVILLE, WIS., July 9—The Wisconsin Carriage Co., one of the oldest and best known manufacturers of fine carriages and vehicles in the middle west, has changed its name to Janesville Products Co. and increased its capital stock from \$100,000 to \$130,000. The

company in recent years has adjusted itself to the newer conditions created by the growth of the automobile industry and henceforth will devote its attention mainly to this line.

#### DIVIDENDS DECLARED

Pyrene Mfg. Co., quarterly of 2½ per cent on common, payable Aug. 1 to stock of record July 20.

Willys-Overland Co., quarterly on common of 75 cents a share, payable Aug. 1 to stock of July 20.

Pierce-Arrow Motor Car Co., \$1.25 per share on common, payable Aug. 1 to stock of record July 14.

Fisher Body Corp., quarterly of 1¼ per cent on preferred stock, payable Aug. 1 to stock of record July 4.

Chevrolet Motor Co., quarterly of 3 per cent, payable Aug. 1 to stock of July 14.

United States Rubber Co., quarterly of 2 per cent on first preferred payable July 31 to stock of record July 20.

AKRON, OHIO, July 6—The Portage Rubber Co. has declared a quarterly dividend of 3 per cent, payable Aug. 14 to stockholders of record Aug. 5. This places Portage stock on a 12 per cent basis.

#### 100 Per Cent Dividend for Universal

OSHKOSH, WIS., July 9—The Universal Motor Co. has declared a 10 per cent cash semi-annual dividend, payable July 1, and will shortly make a 100 per cent stock dividend with the doubling of the capital.

The company plans the provision of 50 per cent more capacity at the present location for the manufacture of marine and automobile engines.

#### Kelsey Wheel Stock Listed

DETROIT, July 9—The preferred and common stock of the Kelsey Wheel Co., of Detroit, is listed among the new securities on the New York Stock Exchange to the extent of \$2,010,100 of 7 per cent cumulative preferred stock and \$8,385,300 common.

#### Jordan Shows 50% Gain

CLEVELAND, July 9—Jordan factory reports show that the business of the company in middle, southwestern and northwestern sections has increased 60 per cent in the last 60 days. Jordan shipments during May totaled 287 cars, making the total value of sales up to June 1 \$2,703,750.

The planned production for the first year up to Sept. 1 was 2000, and of this number 1545 were shipped up to the middle of June. Immediate orders for 236 more cars were on hand at that time.

#### \$11,150,000 Overland June Sales

NEW YORK, July 8—All previous retail sales records were broken by the Willys-Overland Co. in June, when it registered a business of \$11,150,000. This figure is for the United States

alone and does not include Canadian and export sales. On June 25, 1075 cars were sold at retail, \$998,200 worth, a new high mark for a single day's Overland retail sales.

During the first 2 weeks in June daily retail sales averaged \$400,000, which increased to \$450,000 during the week of June 17, and from June 25 to June 30 the daily average was in excess of \$500,000.

Willys-Overland sold on July 5 1264 cars valued at \$1,048,020.

#### Hood Rubber Co. Refinances

BOSTON, July 9—The Hood Rubber Co. is planning to refinance. It will issue \$1,000,000 preferred through a syndicate of bankers composed of Blake Bros. & Co., Spencer, Trask & Co., and Richardson, Hill & Co. This stock will be offered at par in the ratio of one new share for each three now owned. Right to subscribe expires July 22. This financing will increase the outstanding preferred from \$2,750,000 to \$3,750,000.

#### \$1,500,000 Edmunds & Jones Sales

DETROIT, July 7—Total sales of the Edmunds & Jones Corp. for the 5 months ending May 31, 1917, are reported in excess of \$1,500,000. Through operation of the sinking fund more than \$80,000 of the preferred stock has been acquired and canceled.

#### Standard Parts Sales 25% Greater

CLEVELAND, July 5—Sales of the spring division of the Standard Parts Co. in the first 26 days of June increased 25 per cent over the corresponding period in May.

## Securities Continue Slump

### Studebaker, Saxon and Hupp Feature Decline in Automobile Stock Market

NEW YORK, July 10—With the exception of a few stocks, the majority of the automobile and accessories issues last week were under heavy fire from the bears, who are discounting a threatened falling off in sales and scarcity in material. Last week's drop was led by Studebaker, Saxon and Hupp. Studebaker is now operating at about 60 per cent of capacity. The company, it is stated, has on hand liquid assets in excess of every liability amounting to \$23,000,000 and outstanding sight drafts and finished product exceed by 20 per cent the entire amount of notes payable. Studebaker, it is stated, will be conservative in the payment of its dividend. The rate will in all likelihood be reduced at the Aug. meeting.

Saxon and Hupp and United Motor received much attention from the selling public last week. Saxon, on account of the new financing, was a point or two lower, Hupp preferred dropped 18 points, and United Motors reached 25. While the Perlman Rim affair has put a damper on buying of the United Motors stock, it is claimed that the entire Perlman organization could be dropped without impairing the company.

#### \$373,809 Quarterly Income for Kelsey

NEW YORK, July 7—The Kelsey Wheel Co. and subsidiary companies report for the quarter ended March 31

last total income of \$373,809; sales, less returns and allowances, etc., of \$2,761,109, and a balance of \$347,352.

The estimated consolidated income account follows:

|   |             |
|---|-------------|
| Sales, less returns and allowances, etc.          | \$2,761,109 |
| Cost of sales and general and commercial expenses | 2,413,757   |
| Trading profit                                    | \$347,352   |
| Discounts on purchases                            | 10,573      |
| Miscellaneous earnings                            | 15,884      |
| Total income                                      | \$373,809   |
| Reserve for depreciation                          | \$64,726    |
| Interest balance                                  | 11,391      |

Net profit, quarter to March 31.. \$297,692

The estimated consolidated balance sheet as of March 31, as filed with the New York Stock Exchange, follows:

| Assets  |              |
|---|--------------|
| Manufacturing plants, less reserve for depreciation             | \$1,153,334  |
| Machinery, tools and equipment                                  | 1,087,730    |
| Trade names, good will, patent rights, etc.                     | 10,000,000   |
| Lumber  | 315,205      |
| Steel   | 509,218      |
| General stores and supplies                                     | 233,999      |
| Work in process and finished                                    | 504,890      |
| Accounts received less reserve for bad debts                    | 1,228,884    |
| Sundry debtors and notes receivable                             | 26,395       |
| Prepaid expenses  | 71,937       |
| Cash  | 64,223       |
| Deferred assets   | 126,398      |
| Total   | \$15,322,216 |
| Liabilities   |              |
| Preferred stock   | \$3,000,000  |
| Common stock  | 10,000,000   |
| Notes payable   | 600,000      |
| Accounts payable  | 409,407      |
| Other current liabilities                                       | 448,197      |
| Surplus, less preferred dividend and reserve for preferred div. | 864,612      |
| Total   | \$15,322,216 |

#### Tower Truck to Sell Stock

GREENVILLE, MICH., July 11—The Tower Truck Co. has increased its capital from \$50,000 to \$100,000 and will sell stock to the public.

### Automobile Securities Quotations on the New York and Detroit Exchanges

|                                      | Bid    | Asked   | Net Ch'ge |
|--------------------------------------|--------|---------|-----------|
| *Ajax Rubber Co.                     | 68     | 71      | ..        |
| *J. I. Case T. M. Co., pfd.          | 78     | 84      | -2        |
| Chalmers Motor Co. com.              | 9      | 13      | ..        |
| Chalmers Motor Co. pfd.              | ..     | ..      | ..        |
| *Chandler Motor Car Co.              | 82     | 83      | +2        |
| Chevrolet Motor Co.                  | 92     | 94      | -5        |
| Fisher Body Corp. com.               | 34     | 37      | -1        |
| Fisher Body Corp. pfd.               | 87     | 89      | -1        |
| Fisk Rubber Co. com.                 | 74     | 76      | ..        |
| Fisk Rubber Co. 1st pfd.             | 103    | 106     | ..        |
| Fisk Rubber Co. 2nd pfd.             | 92     | 95      | ..        |
| Firestone Tire & Rubber Co. com.     | 122    | 126     | ..        |
| Firestone Tire & Rubber Co. pfd.     | 104    | 106     | -1        |
| *General Motors Co. com.             | 113    | 114     | -2 3/4    |
| *General Motors Co. pfd.             | 90     | 91      | ..        |
| *B. F. Goodrich Co. com.             | 47 1/2 | 48      | +1 3/4    |
| *B. F. Goodrich Co. pfd.             | 104    | 106 1/2 | ..        |
| Goodyear Tire & Rubber Co. com.      | 202    | 205     | +5        |
| Goodyear Tire & Rubber Co. pfd.      | 105    | 107     | ..        |
| Grant Motor Car Corp.                | 3      | 6       | ..        |
| Hupp Motor Car Corp. com.            | 2 1/2  | 3 1/4   | ..        |
| Hupp Motor Car Corp. pfd.            | 72     | 76      | -18       |
| International Motor Co. com.         | 5      | 10      | ..        |
| International Motor Co. 1st pfd.     | 20     | 50      | ..        |
| International Motor Co. 2nd pfd.     | 10     | 30      | ..        |
| *Kelly-Springfield Tire Co. com.     | 46     | 50      | + 1/2     |
| *Kelly-Springfield Tire Co. 1st pfd. | 87     | 95      | ..        |
| *Lee Rubber & Tire Corp.             | 17     | 17 1/2  | - 3/4     |
| *Maxwell Motor Co., Inc., com.       | 46 1/4 | 47      | - 3/4     |
| *Maxwell Motor Co., Inc., 1st pfd.   | 64     | 68      | -3        |
| *Maxwell Motor Co., Inc., 2nd pfd.   | 29     | 30 1/2  | - 1/2     |
| Miller Rubber Co. com.               | 180    | 185     | -5        |
| Miller Rubber Co. pfd.               | 103    | 105     | ..        |
| Packard Motor Car Co. com.           | 135    | 145     | ..        |
| Packard Motor Car Co. pfd.           | 95     | 98      | ..        |
| Paige-Detroit Motor Car Co.          | 26     | 28      | -3        |
| Peerless Truck & Motor Corp.         | 13     | 16      | -1        |
| Portage Rubber Co. com.              | 157    | 161     | -4        |
| Portage Rubber Co. pfd.              | ..     | ..      | ..        |
| Regal Motor Car Co. pfd.             | ..     | 22      | ..        |
| Reo Motor Car Co.                    | 25     | 27      | -2        |
| *Saxon Motor Car Corp.               | 17 1/4 | 18 1/2  | -1 3/4    |

|                                 | Bid    | Asked  | Net Ch'ge |
|---------------------------------|--------|--------|-----------|
| Springfield Body Corp. com.     | 5      | 15     | ..        |
| Springfield Body Corp. pfd.     | 15     | 30     | -5        |
| Standard Motor Construction Co. | 11     | 12     | ..        |
| *Stewart-Warner Speed. Corp.    | 63     | 64     | ..        |
| *Studebaker Corp. com.          | 58 3/4 | 59     | -7 1/2    |
| *Studebaker Corp. pfd.          | 93     | 94     | +1        |
| Swinehart Tire & Rubber Co.     | 60     | 65     | ..        |
| United Motors Corp.             | 25     | 25 1/2 | - 7/8     |
| *U. S. Rubber Co. com.          | 59 1/2 | 60 1/2 | +1 1/2    |
| *U. S. Rubber Co. pfd.          | 107    | 108    | ..        |
| *White Motor Co.                | 47     | 47 1/2 | - 3/4     |
| *Willys-Overland Co. com.       | 31 3/4 | 32     | + 3/4     |
| *Willys-Overland Co. pfd.       | 93 1/2 | 94     | +2 1/2    |

\*At close July 9, 1917. Listed New York Stock Exchange.

#### OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

| ACTIVE STOCKS                    |        |        |           |
|----------------------------------|--------|--------|-----------|
|                                  | Bid    | Asked  | Net Ch'ge |
| Auto Body Co.                    | ..     | 29     | ..        |
| Bower Roller Bearing Co.         | ..     | 38 1/2 | ..        |
| Chevrolet Motor Co.              | ..     | ..     | ..        |
| Commerce Motor Car Co.           | 10     | 12     | ..        |
| Continental Motor Co. com.       | ..     | 7      | ..        |
| Continental Motor Co. pfd. (new) | ..     | 94 1/4 | ..        |
| Edmunds & Jones, com.            | ..     | ..     | ..        |
| Ford Motor Co. of Canada.        | 220    | 235    | ..        |
| Hall Lamp Co.                    | ..     | 24     | ..        |
| Hayes Mfg. Co.                   | ..     | ..     | ..        |
| Michigan Stamping Co. com.       | ..     | 15 1/8 | ..        |
| Motor Products                   | ..     | ..     | ..        |
| Packard Motor Car Co. com.       | ..     | ..     | ..        |
| Packard Motor Car Co. pfd.       | ..     | ..     | ..        |
| Paige-Detroit Motor Car Co.      | ..     | 27 1/2 | ..        |
| Prudden Wheel Co.                | 22 1/2 | 23 1/2 | ..        |
| Reo Motor Car Co.                | 25 1/2 | 26 1/2 | -2        |

| INACTIVE STOCKS     |     |        |           |
|---------------------|-----|--------|-----------|
|                     | Bid | Asked  | Net Ch'ge |
| Atlas Drop Forge    | 38  | 41     | ..        |
| Kelsey Wheel Co.    | 82  | ..     | ..        |
| Regal Motor Car Co. | ..  | 26 1/2 | ..        |



## New Puncture Proof Tire

Pickett Co. of St. Louis Puts Product on Market—Demountable Rim Included

ST. LOUIS, Mo., July 9—The Pickett Puncture Proof Tire Co. of 6015 Michigan Avenue has put on the market the Pickett puncture proof tire. The tire is a departure from those in use and the Ford size sells for \$30. The tire consists of an outer and inner casing and a demountable rim.

The outer casing consists of a rubber tread, then a solid rubber lining, an inner fabric of five plys and a 1/16 in. rubber lining.

The inner casing or tube consists of 3/8 in. rubber face, four plys of fabric and 1/16 in. rubber lining. These are put on with a rim steel band which is airtight after inflation.

It is claimed that blowouts are practically impossible and that punctures seal themselves by reason of the several linings. The inner casing, it is said, will last from 5 to 10 years if not given road wear, but that should the outer casing wear out or be torn, the inner casing will run about 1000 miles on the road.

The present output of the factory is about 100 tires a day.

### National Briscoe Week

JACKSON, MICH., July 6—Briscoe automobile distributors and dealers throughout the United States are celebrating National Briscoe Week from July 7 to July 14, inclusive. The dealers and distributors of the Briscoe Motor Corp. are announcing the event by advertisements throughout the country and are arranging special decorations for their stores.

### Penitentiary Drops Truck Manufacture

COLUMBUS, OHIO, July 7—No more automobile trucks will be built for the present at the penitentiary. H. S. Riddle, of the board of administration, declared that it was practically impossible to get the various parts needed for the machines, and that if any more are needed by the State they would be purchased ready for use. Prisoners at the penitentiary have made more than a dozen heavy trucks during the past 2 years.

### No Coal Shortage

WASHINGTON, July 7—Coal will be available in adequate quantities to meet production demands, according to a statement issued by Franklin K. Lane, Secretary of the Department of the Interior. Secretary Lane bases his statement on figures gathered by his department. These show that coal production in the United States during the past 6

months was the greatest in the history of the country, fully 270,000,000 tons of bituminous coal being produced since Jan. 1, exceeding the figures for the same period last year by 20,000,000.

Better conditions even than these are predicted for the remainder of the year due to the fact that railroad transportation has been improved as the coal can be removed from the mines as rapidly as produced. Quick unloading of coal cars is urged upon the buyers in order that freight congestion, such as experienced during the past winter, may be averted.

### Barnsdale Superheated Manifold Perfected

SUPERIOR, WIS., July 7—J. G. Barnsdale, chief engineer and general manager of the Continental Motor Truck Co., Superior, Wis., which is completing work on its new plant, has perfected a new design of superheated manifold, combining intake and exhaust pipes, for motor vehicles, making the use of kerosene and the heavier distillates of petroleum possible with the ordinary carbureter. The first design is one for Ford cars, and in exhaustive tests it has been found that a car of this kind not only will travel 10 m.p.h. faster on kerosene than on ordinary gasoline, but 10 m.p.g. further. The plan of the device differs radically from those designed for gasoline. Instead of spraying the fuel into the cylinder, the Barnsdale device holds the kerosene in the manifold until the heat has vaporized it, and it then passes into the combustion chamber. The new manifold will be marketed by the Superior Manifold Co., controlled by Mr. Barnsdale, and will be made in the new truck plant. Patents have been applied for.

### Morgan Potter Abandons Plan To Build Automobiles

BEACON, N. Y., July 7—The Morgan Potter Mfg. Co., which recently changed its name to the Morgan Potter Motor Co. to devote its plant to the manufacture of a four-cylinder, five-passenger touring car, a light truck and truck converters, has decided to abandon all such plans. It will continue to make brakes for trucks.

### Big Canadian Car Sales

CALGARY, ALBERTA, July 6—The Canadian Pacific Railway reports from Alberta that a Lethbridge automobile dealer has ordered \$1,000,000 worth of automobiles for the Southern Alberta trade, mostly farmers. Southern Alberta has had two immense crops and expects a record yield again this year, with the result that farmers are buying automobiles.

DETROIT, July 7—The Michigan Auto Trailer Co. has filed a petition of bankruptcy; liabilities, \$5,993.31; assets, \$10,088.27.

## Peerless Winner at Uniontown

Clinches Track Championship —Boyer in Frontenac Defeats Vail in Hudson

UNIONTOWN, PA., July 4—Local track records on the Uniontown speedway for the 112-mile event were shattered here this afternoon in the dealers' non-professional race by I. P. Fetterman of Pittsburgh, driving a Peerless, and by Denney W. Hickey of Connellsville, driving Ira Vail's Hudson Super-Six. The two drivers finished first and second in the order named, Fetterman in 1:13:40.56 and Hickey coming in fifteen seconds later in 1:13:55.03. Jack Conway of Greensburg, in a Hudson, Charles W. McFarland, in a Murray, and R. M. Shoff of Pittsburgh, in a Haynes Twelve, finished in the order named.

The Fourth of July program was a big day for I. P. Fetterman. By winning to-day's event he cinched the track championship in the dealers' race, the award carrying with it the Johnson trophy and a bonus of \$500. He also came home first in the Australian pursuit race, besting Hickey after a lively battle of twenty-one laps around the mile and an eighth track. Fetterman's winnings for the day totaled \$1450.

### Boyer and Vail Star

Honors for the four-cornered match race with Joe Boyer, in Louis Chevrolet's Frontenac; Ira Vail, in his Hudson Super-Six; Earl Cooper, in his winning Chicago Stutz, and Louis Fontaine in Ralph De Palma's Mercedes, were divided between Boyer and Vail.

Boyer took the first heat of ten laps with apparent ease, Vail romped home with the second of twenty laps without any difficulty and two drivers locked in a duel for the deciding fifty-lap heat. Vail lost a tire early in the race and was unable to regain the lost time although he finished a fraction more than two seconds after Boyer got the flag.

### A Fight for First Place

Before the pack had entered into the tenth lap of the dealers' race it had resolved itself into a battle royal among four cars, with Fetterman, Hickey, Conway and Charles W. McFarland each making a super effort for the first honors. The cars were bunched for all of fifty laps, sometimes not a car length separating them all. Fetterman and Hickey gradually drew away from the others and the two cars finished several minutes ahead of the leaders in the second division.

Fetterman maintained the lead from the first with the exception of the thirty-ninth lap, when Hickey nosed ahead of him for several seconds, but Fetterman had regained his lead before the tape was crossed in the fortieth lap. Hickey trailed the leading Peerless throughout

the race and at times inches separated the two.

The third heat of fifty laps in the match race provided the most thrilling racing on the program. Ira Vail lost a shoe in the fifth lap, but came back strong after losing a lap in making the change. From the fifteenth lap until the fortieth, Vail and Boyer ran neck and neck, with Vail an entire lap behind. On that lap one of Boyer's tires commenced to give way and he slowed down to an 85-mile speed which he maintained until getting the checkered flag. Vail kept up the furious pace he had set

throughout the heat and walked away from Boyer in the fortieth lap, but was unable to regain the lap lost in making the tire change. He finished a fraction more than two seconds behind the Frontenac.

It is estimated that 15,000 people witnessed the races.

#### New Spotlight from Los Angeles

LOS ANGELES, CAL., July 6—The Accessories Supply Co. has brought out a spotlight using a flexible metallic tubing for support instead of the conventional

bracket. This tubing is similar to that used for speedometer cable-casings. The Kaybee spotlight may be thrown instantly in any desired direction. It is of the concentrating type. A thumb switch is conveniently located just in back of the reflector. Connection is made at the dash by means of a small socket connection and bracket combined. A 6-volt, 24-candlepower nitro globe is used in the spotlight. The equipment also contains 10 ft. of flexible wiring, fitted with plug and socket, thus enabling the spotlight to be used as an inspection lamp.

## Calendar

### ASSOCIATIONS

- Aug. 6-10—Convention at Atlantic City under auspices of Cycle Parts and Accessories Assn.
- Sept. 12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, Mid - Season Meeting.
- Sept. 25-28—Pittsburgh National Assn. of Purchasing Agents, Convention.

### CONTESTS

- July 14—Minneapolis, Twin City Speedway, 50 and 100 mile professional races and 10 mile race for Ford specials and 20 mile race for local drivers.
- July 14—Rochester, N. Y., Hillclimb.

- July 15—Missoula, Mont., Track Race.
- July 17-19—Buffalo, N. Y., Inter-city Reliability.
- July 22—Anaconda, Mont., Track Race.
- July 29—Great Falls, Mont., Track Race.
- Aug. 5—Billings, Mont., Track Race.
- Aug. 17—Flemington, N. J., Track Race.
- Sept. 3—Uniontown, Pa., Speedway Race.
- Sept. 3—Cincinnati, O., Speedway Race, Championship.
- Sept. 6—Red Bank, N. J., Track Race.
- Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.

- Sept. 15—Providence, R. I., Speedway Race, Championship.
- Sept. 22—Allentown, Pa., Track Race.
- Sept. 28—Trenton, N. J., Track Race.
- Sept. 29—New York Speedway Race, Championship.
- Oct. 6—Danbury, Conn., Track Race.
- Oct. 6—Uniontown, Pa., Speedway Race.
- Oct. 13—Richmond, Va., Track Race.
- Oct. 13—Chicago Speedway Race, Championship.
- Oct. 27—New York Speedway Race.

### S. A. E.

- Aug. 6—Motorcycle Division, Atlantic City.

### SHOWS

- Aug. 6-10—Fremont, Neb., General Tractor Demonstration.
- Sept. 2-9—Spokane, Wash., Interstate Fair.
- Sept. 9-15—Milwaukee Show, State Park Fair, West Allis.
- Sept. 9-15—Milwaukee, Wis., Fall Show, Wisconsin State Fair, West Allis, Milwaukee Automobile Dealers.
- Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers Assn. State Fair.
- 1918
- Jan. 5-12—New York Show, Grand Central Palace, National Automobile Chamber of Commerce.

## Engineering Calendar

American Railway Master Mechanics' Assn.  
American Institute of Electrical Engineers.  
Master Builders' Assn.  
American Society of Heating and Ventilating Engineers.  
Association Iron and Steel Electrical Engineers.  
Mining and Metallurgical Society of America.  
Society of Automotive Engineers.

Illuminating Engineering Society.  
National Electric Light Assn.  
National Gas Engine Assn.  
American Society for Testing Materials.  
American Institute of Metals.  
American Foundrymen's Assn.  
Society Naval Architects and Marine Engineers.

### JULY

- 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
- 14—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 16—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
- 21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### AUGUST

- 4—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
- 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
- 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
- 11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
- 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
- 20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
- 21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### SEPTEMBER

- 1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
- 8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.
- 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
- 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
- 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
- 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
- 15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
- 17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
- 20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.
- 24—Amer. Inst. Metals at Boston.
- 24—Amer. Fdvy. Assn. annual meeting at Boston.

### OCTOBER

- 6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
- 8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

- 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
- 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
- 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
- 13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
- 17-18-19—Amer. Gas. Inst. at Washington, D. C.
- 18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.
- 20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### NOVEMBER

- 3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
- 8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.
- 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
- 10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
- 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

### DECEMBER

- 1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
- 8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
- 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
- 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
- 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
- 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
- 15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
- 17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
- 20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.